NORTHEAST ELECTRONICS

A DIVISION OF NORTHERN TELECOM, INC.

INSTRUCTION MANUAL

MODEL 2761
MF SIGNALING DISPLAY

No. A2761-02-600 ISSUE 5 DATE JUNE 1976

PRINTED IN U.S.A.

Airport Rd., Concord, N.H. 03301 • (603) 224-6511 • TELEX 94-3453

CALIBRATION / SERVICE SPECIFICATION
GTE EQUIPMENT SERVICES

ITEM NAME: MF Signaling Display	SPEC NO:ESC- 1051-92-0
MANUFACTURER: North East	DATE: 02/28/92
MODEL: 2761	APPROVED: Sep

CALIBRATION REQUIREMENTS

SOURCE: GTE NORTH	COPIES ISSUED:	MAXIMUM INTERVAL: 12 MONTHS

APPLICABLE PAGES FOR TECHNICIANS USE.

ALL PAGES ARE APPLICABLE.

MISCELLANEOUS NOTES.

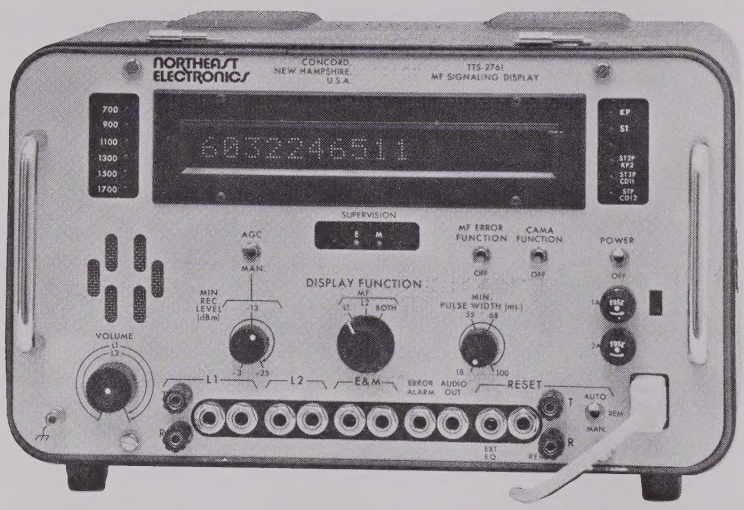
REQUIRED CALIBRATION STICKER.

Calibration: X
Performance Check: ___
Limited Calibration: ___
Primary Standards: ___
Other: ___ (see misc. notes)

TAMPER PROOF SEAL REQUIRED.

YES X NO ___

If applicable



NORTHEAST ELECTRONICS

A DIVISION OF NORTHERN TELECOM, INC.

INSTRUCTION MANUAL

MODEL 2761
MF SIGNALING DISPLAY

No. A2761-02-600 ISSUE 5 DATE JUNE 1976

PRINTED IN U.S.A.

Airport Rd., Concord, N.H. 03301 • (603) 224-6511 • TELEX 94-3453

2C-2761-0676

TABLE OF CONTENTS

SECTION	TITLE	PAGE
1	**DESCRIPTION**	1-1
	1.1 Introduction	1-1
2	**SPECIFICATIONS**	2-1
	2.1 Introduction	2-1
3	**INSTALLATION AND OPERATING INSTRUCTIONS**	3-1
	3.1 Introduction	3-1
	3.3 Visual Inspection	3-1
	3.5 Installation	3-1
	3.8 Operational Check	3-1
	3.11 Normal Control Settings	3-6
	3.13 Normal Transmission Observation	3-6
	3.15 Automatic Reset Operation	3-8
	3.17 Remote Reset Operation	3-8
	3.19 Diagnostic Operation In Multifrequency (MF) Signaling Systems	3-8
	3.21 Detecting Insufficient Or Excessive Component Frequencies: The Error Function	3-8
	3.25 Examples Of Error Function Operation	3-8
	3.28 Detecting Excessive Difference In Transmission Levels Or Too Low Compound Signal Levels	3-9
	3.36 Detecting Short MF Pulses (Machine Sent)	3-10
	3.39 SF (VF) Filters	3-10
	3.41 Operation In CAMA Systems	3-10
	3.44 Data Interpretation	3-11
	3.46 Connections, Control Settings And Operation	3-11
	3.48 Examples Of CAMA Operation	3-11
4	**CIRCUIT DESCRIPTION**	4-1
	4.1 Introduction	4-1
	4.3 Block Diagram Description	4-1
	4.4 Reproduction Of Audio	4-1
	4.7 MF Signaling With E&M Supervision	4-1
	4.21 MF Signal Processing With SF Supervision (Options 4 and 5)	4-3
	4.23 Detailed Circuit Description	4-3
	4.26 MF Input (AGC) A2	4-4
	4.34 Dual AGC A2 (Options 4 and 5 only)	4-4
	4.36 MF And SF Detectors A4,A5,And A6	4-4
	4.40 Main Input A3	4-5
	4.52 MF Decoder A8	4-6
	4.59 Error Detector A7	4-6
	4.65 MF Register A9	4-7
	4.72 Buffer A11	4-7
	4.77 Interconnection A12	4-8
	4.79 Code, Supervision And Frequency Lamp Boards (A13,A14, And A15)	4-8
	4.82 Accessory A17	4-8
5	**MAINTENANCE AND CALIBRATION**	5-1
	5.1 Introduction	5-1
	5.3 Service Information	5-1
	5.5 Test Equipment	5-1
	5.7 Maintenance	5-1
	5.8 Access/Disassembly	5-1
	5.10 Performance Check	5-1

Table of Contents (cont'd).

SECTION	TITLE	PAGE
	5.15 Troubleshooting	5–3
	5.19 Calibration	5 - 3
	5.22 Power Supply (A1)	5 - 5
	5.24 Main Input, (A3)	5 - 6
	5.26 MF Input, (A2)	5 - 6
	5.28 MF Input, Options 4 and 5 (A2)	5 - 7
	5.30 Main Input Card, Options 4 and 5 (A3)	5 - 7
	5.31 SF (VF) And MF Detectors (A4,A5,A6)	5 - 7
	5.69 Response Time Adjustment (A5 And A6 only)	5 - 12
6	**ELECTRONIC PARTS LIST**	6 - 1
	6.1 Introduction	6 - 1
7	**SCHEMATIC DIAGRAMS**	7 - 1
	7.1 Introduction	7 - 1

LIST OF ILLUSTRATIONS

FIGURE	TITLE	PAGE
3–1	Model 2761R Installation Drawing	3–2
3–2	Model 2761R Controls, Connectors, and Indicators	3–6
3–3	Model 2761 MF Error Sequence Flow Chart Diagram	3–9
4–1	Model 2761 Audio Processing and Power Supply Block Diagram	4–1
4–2	Model 2761 MF Signal Processing with E and M Supervision Block Diagram	4–2
4–3	Model 2761 MF Signal Processing with SF (VF) Supervision Block Diagram	4–3
5–1	Model 2761 Triple Selective Detector Calibration Control Function and Location	5–8
5–2	Model 2761 Quad SF (VF) Detector Calibration Control Function and Location	5–9
5–3	Model 2761 700 Hz Selective Detector Response After Filter Frequency Calibration	5–13
5–4	Model 2761 700 Hz Selective Detector Response After F1A Level Adjustment	5–13
5–5	Model 2761 700 Hz Selective detector Response After F1A and F1B Calibration	5–13
6–1	Model 2761 Power Supply A1 (95875), Component Location	6–6
6–2	Model 2761 Transformer Assembly Component Location	6–8
6–3	Model 2761 MF Input (AGC) A2 (95883), Component Location	6–10
6–4	Model 2761 Dual MF Input (AGC) A2 (96588) For Options 4 and 5, Component Location	6–13
6–5	Model 2761 Main Input A3 (96592), Component Location	6–16
6–6	Model 2761 Quad SF (VF) Detector A4 (96590), Component Location	6–19
6–7	Model 2761 Triple MF Selective Detector A5 and A6 (96568), Component Location	6–21
6–8	Model 2761 Error Detector A7 (96554) For Options 4 and 5, Component Location	6–25
6–10	Model 2761 MF Decoder A8 (95874), Component Location	6–27
6–11	Model 2761 Register A9 (96591), Component Location	6–29
6–12	Model 2761 Buffer A11 (96551), Component Location	6–31
6–13	Model 2761 Interconnection A12 (96580), Component Location	6–32
6–14	Model 2761 Code Lamp A13 (95935), Component Location	6–33

List of Illustrations (cont'd)

FIGURE	TITLE	PAGE
6–15	Model 2761 Supervision Lamp A14 (96589), Component Location	6–34
6–16	Model 2761 Supervision Lamp A14 (96589), For Options 4 and 5, Component Location	6–35
6–17	Model 2761 Frequency Lamp A15 (95937), Component Location	6–36
6–18	Model 2761 Termination A16 (95932), Component Location	6–37
6–19	Model 2761 Accessory A17 (96593), Component Location	6–38
7–1	Model 2761 Overall Schematic Diagram	7–2
7–2	Model 2761 Power Supply A1, Schematic Diagram	7–3
7–3	Model 2761 MF Input (AGC) A2, Schematic Diagram	7–4
7–4	Model 2761 Dual (AGC) A2 (Options 4 and 5), Schematic Diagram	7–5
7–5	Model 2761 Main Input A3, Schematic Diagram	7–6
7–6	Model 2761 SF (VF) Detectors A4, Schematic Diagram	7–7
7–7	Model 2761 MF Detectors A5 and A6, Schematic Diagram	7–8
7–8	Model 2761 Error Detector A7, Schematic Diagram	7–9
7–9	Model 2761 MF Decoder A8, Schematic Diagram	7–10
7–10	Model 2761 Register A9, Schematic Diagram	7–11
7–11	Model 2761 Buffer A11, Schematic Diagram	7–12
7–12	Model 2761 Code Lamp A13, Schematic Diagram	7–13
7–13	Model 2761 Supervision A14, Schematic Diagram	7–14
7–14	Model 2761 Frequency Lamp A15, Schematic Diagram	7–15
7–15	Model 2761 Termination A16, Schematic Diagram	7–16
7–16	Model 2761 Accessory A17, Schematic Diagram	7–17

LIST OF TABLES

TABLE	TITLE	PAGE
2–1	Specifications	2–1
3–1	Controls,Indicators and Connectors	3–3
3–2	Patching and Basic Control Positions For Two-Wire And Four-Wire Operations	3–7
3–3	Multifrequency Signaling Recognized By The Model 2761	3–12
3–4	Glossary Of Equivalent Terms For R1 And CCITT# 5 Signaling Systems	3–13
5–1	Test And Calibration Equipment	5–2
5–2	Model 2761, Troubleshooting Guide	5–4
5–3	Power Supply Specifications	5–6
5–4	Filter Frequency Chart For SF (VF) And MF Detectors (A4,A5,A6)	5–11
6–1	Model 2761, Overall Parts List	6–2
6–2	Model 2761R, Overall Parts List	6–3
6–3	Model 2761 Option 4, Overall Parts List	6–4
6–4	Model 2761R Option 5, Overall Parts List	6–5
6–5	Model 2761 Power Switch Assembly S4, Parts List	6–6
6–6	Model 2761 Power Supply A1 (95875), Parts List	6–6
6–7	Model 2761 Transformer Assembly Parts List	6–8
6–8	Model 2761 MF Input (AGC) A2 (95883), Parts List	6–9
6–9	Model 2761 Dual MF Input (AGC) A2 (96588) For Options 4 and 5, Parts List	6–11
6–10	Model 2761 Main Input A3 (96592), Parts List	6–14
6–11	Model 2761 Quad SF (VF) Detector A4 (96590), Parts List	6–17
6–12	Model 2761 Triple MF Selective Detector A5 (96568), Parts List	6–19
6–13	Model 2761 Triple MF Selective Detector A6 (95658), Parts List	6–22
6–14	Model 2761 Error Detector A7 (96554), Parts List	6–24
6–15	Model 2761 Error Detector A7 (96554) For Options 4 and 5, Parts List	6–25
6–16	Model 2761 MF Decoder, A8 (95874) Parts List	6–26
6–17	Model 2761 MF Decoder Options 4 and 5, A8 (95874) Parts List	6–27

List Of Tables (cont'd)

TABLE	TITLE	PAGE
6–18	Model 2761 Register A9 (96591), Parts List	6–28
6–19	Model 2761 Buffer A11 (96551), Parts List	6–30
6–20	Model 2761 Interconnection A12 (96580), Parts List	6–32
6–21	Model 2761 Code Lamp A13 (95935), Parts List	6–33
6–22	Model 2761 Supervision Lamp A14 (96589), Parts List	6–34
6–23	Model 2761 Supervision Lamp A14 (96589) For Options 4 and 5, Parts List	6–35
6–24	Model 2761 Frequency Lamp A15 (95937), Parts List	6–36
6–25	Model 2761 Termination A16 (95932), Parts List	6–37
6–26	Model 2761 Accessory A17 (96593), Parts List	6–38

SECTION 1

DESCRIPTION

1.1 INTRODUCTION.

1.2 The Northeast Electronics Model 2761 family of MF Signaling Displays are solid-state, bridging test sets that display monitored MF codes, digits, and supervision appearing on standard 2-wire or 4-wire trunks. Options 4 and 5 are suitable for complete monitoring of CCITT # 5 signaling systems.

1.3 The Model 2761 test set provides the following: a display of each valid MF tone received; MF codes; a collective display of up to sixteen digits that can be reset by three preselected modes of operation (automatic, remote, or manual); automatic and manual signal level gain controls, which are instrumental in diagnosing low-level signals or excessive differences in transmission levels; an indication of MF transmissions having other than two component frequencies (Error Function); a speaker for audio monitoring; an adjustable pulse-width control to help diagnose marginal or faulty signal transmission; supervisory information including E&M conditions and, with Options 4 and 5, SF1 and SF2 on two-wire or four-wire trunks; an auxiliary output connector that provides digital data (in BCD format), MF codes, data present and clear, supervision, and error indications in TTL format for use with auxiliary equipment such as printers, computers, or the Northeast Electronics Model 2765 Call Disposition Analyzer. The use of printers or computers will require interfacing circuitry.

1.4 One of the many applications of the Model 2761 is in the Model 2765 Call Disposition Analyzer System, in which the Model 2761 monitors individual trunks via a trunk access unit. The Model 2761 interprets the signaling on the trunk and relays the data to the Model 2765 unit for processing.

1.5 All 2761 models operate from either 115V or 230V 50-60 Hz. This is switch selectable with a front panel slide switch.

SECTION 2

SPECIFICATIONS

2.1 INTRODUCTION.

2.2 Table 2—1 lists the specifications for the Model 2761.

Table 2—1. Model 2761 Specifications.

ELECTRICAL

MF and SF Receivers (L1 & L2)	SF receivers on Options 4 and 5 only.
Input Impedance	Greater than or equal to 20K, dc blocked.
Input Isolation	1 megohm to ground.
MF Minimum Sensitivity	
AGC	—25 dBm.
AGC (Options 4 and 5)	—30 dBm.
MAN	—23 to —3 dBm adjustable.
MF Dynamic Range:	
AGC	31 dB.
MAN	20 dB (+3 dB, —0 dB of MIN REC LEVEL control setting).
Compound SF Minimum Sensitivity	—30 dBm.
Compound SF Dynamic Range	31 dB.
Single SF Minimum Sensitivity	—25 dBm.
Single SF Dynamic Range	31 dB.
Maximum Difference in Transmission Level Between Two Simultaneous Tones (MF or Compound SF)	6 dB.
SF Receivers	Two per channel, 2400 and 2600 Hz.
SF Filter Band Widths	± 25 Hz minimum.
MF Filter Band Widths:	
AGC	3% to 5% of center frequency.
MAN	Depends on signal level and manual gain setting.

Table 2—1 (cont'd).

Minimum Pulse Width	12 ± 5 ms to 100 ± 5 ms, adjustable.
Minimum Interval Between Pulses	10 ms.
Minimum Error Signal Pulse Width	12 ms.
Minimum Four Wire SF Seizure Signal to Effect Reset	95 ms.
Remote Reset:	
Reset Command	Switch closure T to R (≤100 ohms) or TTL/DTL/RTL logic 0 (R = ground).
Command Sequence	Open (logic 1) for ≥ 10 ms prior to closure (logic 0). Closure ≥ 20 ms.
Command Current (logic 1)	I ≤ 0.1 mA, source or sink.
External Equipment Reset:	
Contact Rating	10 watts resistive, 50V or 0.5A max.
Supervision Display:	
E lamp lit	V tip more negative than −10V or open.
E lamp extinguished	V tip more positive than −10V.
M lamp lit	V ring more positive than −22V or open.
M lamp extinguished	V ring more negative than −23V.
L1 2400 lamp lit	2400 ± 25 Hz, present on L1, level from −25 to +6 dBm.
L1 2600 lamp lit	2600 ± 25 Hz, present on L1, level from −25 to +6 dBm.
L2 2400 lamp lit	2400 ± 25 Hz, present on L2, level from −25 to +6 dBm.
L2 2600 lamp lit	2600 ± 25 Hz, present on L2, level from −25 to +6 dBm.
Supervision Input Current:	
Supervision Jacks:	
V_{in} = 0 volts	I_{in} ≤ 1.5 mA (source).
V_{in} = −48 volts	I_{in} ≤ 0.1 mA (sink).

Table 2—1 (cont'd).

L1, L2 Input Current:	
V_{in} = 0 volts	$I_{in} \leq$ 10 microamp (source).
V_{in} = −48 volts	$I_{in} \leq$ 300 microamp (sink).
Audio (L1 or L2):	
Input Impedance	⩾ 20 kohms, dc-blocked.
Input Level	−35 dBm to +10 dBm per line.
Output	L1 and L2 audio added.
Accessory Audio	−35 ± 4 dBm to −11 ± 4 dBm (with −25 dBm input) dependent on setting of volume controls.
Accessory Start	
Contact Rating	230 V, 1A maximum.
POWER	115 Vac, ±10 Vac, 50/60 Hz, 60 watts; or
	230 Vac, ± 20 Vac, 50/60 Hz, 60 watts.
ENVIRONMENTAL	
Operating:	
Ambient Temperature	+15°C to +35°C (+59°F to +96°F).
Relative Humidity	0 to 85%.
Storage	
Ambient Temperature	0°C to +70°C (+32°F to +158 °F).
Relative Humidy	0 to 85%.
MECHANICAL	
Outside Dimensions:	
Model 2761 (Portable Units)	14-in. w x 8-1/4-in. h x 14-1/4-in. d (21.0 cm x 35.6 cm x 36.2 cm)
Model 2761R (Rack Units)	19-in. w x 8-23/32-in. h x 9-7/8-in. d (48.3 cm x 22.1 cm x 25.1 cm).

Table 2—1 (cont'd).

Handles:	
(Portable Units):	1-3/8-in. beyond front panel (3.5 cm).
(Rack Units):	1-1/4-in. beyond front panel bezel (3.18 cm).
Mounting Model 2761R (Rack Units)	Standard 19-in. rack.
Weight	Approximately 31 lb. (14.1 kg).
GENERAL	
Numeric display:	
Type	Single plane neon dot matrix.
Capacity	16 digits simultaneously.
Character Size	0.4-in. h (1.02 cm) x 0.28-in. w (0.71 cm).
MF Codes:	
Type	Individual LEDs with caption.
Codes	KP1, KP2/ST2P, ST, CD11/ST3P, CD12/STP.
MF Frequencies:	
Type	Individual LEDs with caption.
Frequencies	700, 900, 1100, 1300, 1500 & 1700 Hz.
SF Frequencies (Options 4 and 5):	
Type	Individual LEDs with caption.
Frequencies	L1 2400, L1 2600, L2 2400, L2 2600.
Reset:	
Type	Automatic KP1 or KP2/ST2P or (Options 4 and 5) SF seizure, remote (REM) or manual (MAN) reset modes.

SECTION 3

INSTALLATION AND OPERATING INSTRUCTIONS

3.1 INTRODUCTION.

3.2 This section contains installation and operating instructions for the Model 2761 family of MF Signaling Displays. The basic differences among the six options are explained in paragraph 3.6. The operating instructions are identical for the six units, except as noted. Table 3—1 lists the function of the controls, indicators, and connectors, most of which are shown in Figure 3—2 with their reference designators. Table 3—2 explains patching and basic control positions for two-wire and four-wire operations. Table 3—3 lists the multifrequency digits and codes recognized by the Model 2761, Table 3—4 is a glossary of equivalent terms used in the R1 and CCITT # 5 Signaling Systems. Paragraphs 3.7 through 3.49 provide the necessary information for the operation of the Model 2761.

3.3 VISUAL INSPECTION.

3.4 Examine the Model 2761 for obvious damage in shipping. Check the numeric display housing for cracks.

3.5 INSTALLATION AND PREPARATION.

VERSION	TITLE	AC POWER	MOUNTING
2761	MF Signaling Display	115V/230V	Portable
2761R	MF Signaling Display	115V/230V	Rack
Option 4	MF Signaling Display w/SF (VF) Supervision	115V/230V	Portable
Option 5	MF Signaling Display w/SF (VF) Supervision	115V/230V	Rack

3.6 Normally, all versions of the 2761 are shipped with the 115V/230V power select switch set to the 115V position. Before inserting the power cord into the main power source, check to ensure that the front panel 115V/230V power switch is set to match the main power source to be used. In, addition, all 2761 models with the exception of options 4 and 5 are strapped for R1 signaling. Options 4 and 5 are strapped for CCITT No. 5 signaling. To change the strapping, refer to Figure 6—10 for strapping locations. These are also shown on schematic diagram Figure 7—9.

3.7 The rack units can be mounted in a 19-inch rack for a more permanent installation. Unlike the portble units, recessed ac power plug J16 and the accessory connector J23 are mounted on the rear of the rack units. Parallel connections to all the jacks on the front panel are brought out to a terminal strip at the rear of the unit as shown on Figure 3—1. The inputs to the Model 2761 can be connected to any two-wire or four-wire trunk patch bay directly or via a trunk access unit. Refer to Table 3—2 for input selection and connections. Table 3—1 provides a functional description of controls, indicators and connectors, most of which are shown in Figure 3—2.

3.8 OPERATIONAL CHECK.

3.9 Remove the power cord from the Model 2761 cover compartment and connect it to the power plug. Turn AC power switch S4 off. Insert the other end into a 115 Vac 50/60 Hz source (230 Vac, 50/60 Hz). Check position of 115-230V switch S5 to match source.

3.10 Without additional connections to the unit, perform the following pre-operation checkout procedure:
Turn AC POWER switch S4 on. The frequency lamps may flash on or remain on. The E&M lamps will light; the SF lamps will not. Some of the MF code lamps may be on; numeric display may have random digits or symbols. Momentarily depress RESET switch S2 to the MAN position. All frequency lamps and code lamps will be extinguished; any digits or symbols on the digital display will disappear: the E&M lamps will remain lit; and SF lamps will remain extinguished.

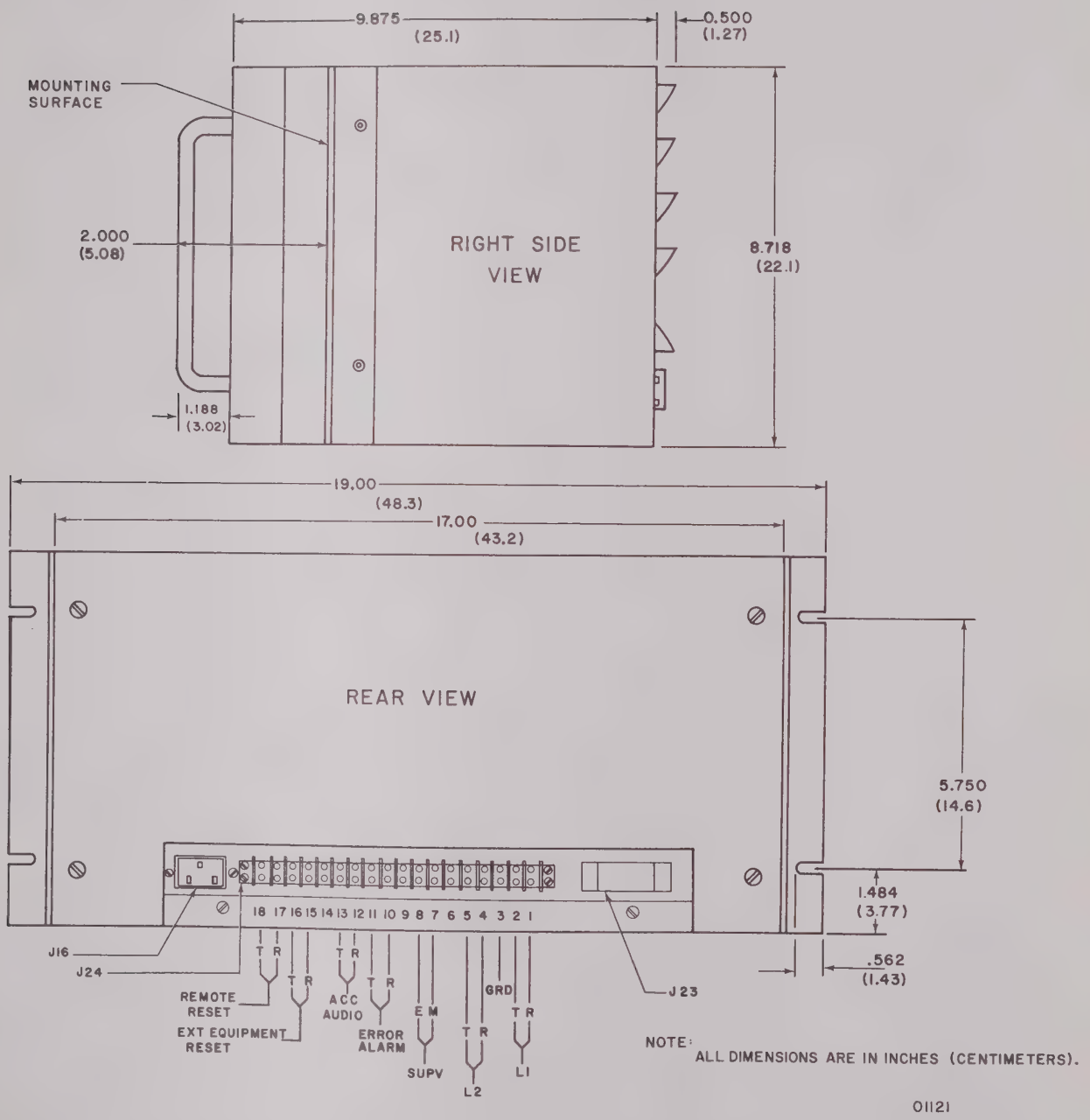


Figure 3—1. Model 2761R Installation Drawing.

Table 3—1. Controls,Indicators and Connectors.

REF DESIG	CONTROL,INDICATOR OR CONNECTOR	FUNCTION
F1	One ampere AC power fuse (slo blo)	Provides 1A protection through the phase input lead.
F2	2 ampere AC power fuse (slo blo)	Provides 2A protection through the return or neutral input lead (or through the second phase lead in 230 Vac systems).
J1	Chassis ground banana jack binding post	Connector for an external common ground connection.
J2-J5	L1 jacks	Connected in parallel, J4,J5, and banana jack binding posts (J2 & J3) provide access to dc-blocked, high-impedance input for monitoring MF,SF, and audio signaling.
J6,J7	L2 jacks	Connected in parallel, J6 and J7 provide access to dc-blocked, high-impedance input for monitoring MF, SF, and audio signaling.
J8,J9	E&M jacks	Provides two parallel-connected 310 jacks for monitoring E and/or M supervision. The tip of each jack is connected to the E off hook detector; the ring of each jack to the M off hook detector.
J10	ERROR ALARM jack	After reception of an MF error signal, a dry (relay) contact closure is provided and rated at 230 Vac, 1A. Contacts open upon reception of a reset command.
J11	ACC AUDIO jack	Provides a combined output of the monitored signal on L1 and L2 inputs, depending on volume control settings (R1, R2), but independent of display function switch position S1. (Input impedance = 1 kohm, with ring at chassis ground).
J12	EXT EQUIP RESET jack	Proyides a dry (relay) contact closure across tip and ring when a remote or manual reset command is received. Contacts are rated at 50V, 10 watts or 0.5A.
J13-J15	REMOTE RESET T-R banana jack, binding post and 310 jack	Inputs for reception of remote reset commands in the form of a contact closure across tip and ring (less than or equal to 100 ohms) or TTL/DTL/RTL logic 0 (R = ground).
J16	115/230 VAC recessed plug (located on rear of rack-mounted units)	Input connector for ac power.

Tabel 3—1 (cont'd).

	CONTROL,INDICATOR OR CONNECTOR	FUNCTION
J23	Accessory Output connector (located on rear of rack-mounted units)	Provides TTL information concerning MF digital data (in BCD format), MF codes and frequencies, data present and reset, supervision, and error indications, and a remote reset input. These outputs have a fan-out of two and are intended for use with auxilliary equipment such as Model 2762 Call Disposition Analyzer, printers and computers.
J24	Jones strip connector (on rear of rack-mounted units only)	Provides hard wiring terminations for permanent installation of rack-mounted units. Located on rear of these units, contacts are connected in parallel with all front panel input jacks.
LS1	Speaker	Provides audio range sounds present on L1 and L2, dependent on volume control (R1,R2) settings.
R1,R2	VOLUME L1, L2 controls (dual potentiometer)	Vary speaker volume and output level to ACC AUDIO jack of input signals monitored on L1 and L2.
R3	MIN REC LEVEL (−3 dB to −23 dB) control	With AGC/MAN switch S3 in MAN position, this control varies level of input MF signal below which there will be no display.
R4	MIN PULSE WIDTH control (12 ms to 100 ms)	Provides adjustment for setting minimum acceptable pulse width of any MF signal.
S1	DISPLAY FUNCTION switch	Selects either or both input channel for MF decoding & display.
S2	RESET switch (AUTO, REM, MAN)	In AUTO position, digital, code, and frequency (if frozen) lamp displays automatically reset with each KP1 (or KP2 in options 4, and 5), or, with options 4 and 5, with each four-wire SF seizure signal, or with a remote reset. In REM position, displays are not reset automatically by a KP or seizure signal, but instead require a remote reset from an external source via REMOTE RESET jacks J13 or J14 and J15. Refer to Section 2 for remote reset command specifications. The external equipment relay will operate with each remote reset command. MAN position is a momentary operation. At any time RESET switch can be depressed to this postion for local reset of code and digital displays, error indications, if any, and for operating external equipment reset relay.
S3	MIN REC LEVEL AGC/MAN switch	In AGC position, unit will accept MF signal levels from −25 to +6 dBm (−30 to +1 dBm in options 4 and 5). MAN position allows selective minimum MF input level using MIN REC LEVEL control (−3 to −23 dBm).

Table 3—1. (cont'd).

REF DESIG	CONTROL,INDICATOR OR CONNECTOR	FUNCTION
S4	POWER switch	In upper position, applies ac power to internal circuitry.
S5	115/230 slide switch	This switch allows Model 2761 to operate from either 115 Vac or 230 Vac.
S6	CAMA FUNCTION switch (Excluding Options 4 and 5).	Top position causes digital display to latch on second ST (ST or STP or ST2P or ST3P) signal encountered instead of first.
S7	ERROR FUNCTION switch	In OFF position, digital display ignores erroneous MF transmissions. When ON, this control enacts three functions upon receipt of any MF signal not having two component frequencies; frequency lamps on at time of error are frozen on; digital display generates a colon (:); and ERROR ALARM relay operates. Subsequent errors are acknowledged by a colon while proper MF is displayed as such. All conditions are reset by a reset command; reception of an ST disables Error Function circuitry.
T1	internal	Power transformer accepts at its primaries ac power through 115/230 VAC switch S5 and produces at its secondaries raw ac levels needed to provide working internal dc supply potentials: +250V, +5V, ± 12V.
U1	Numeric Display	Displays up to 16 digits simultaneously with any spill-over replacing previously displayed digits, starting with first digit.

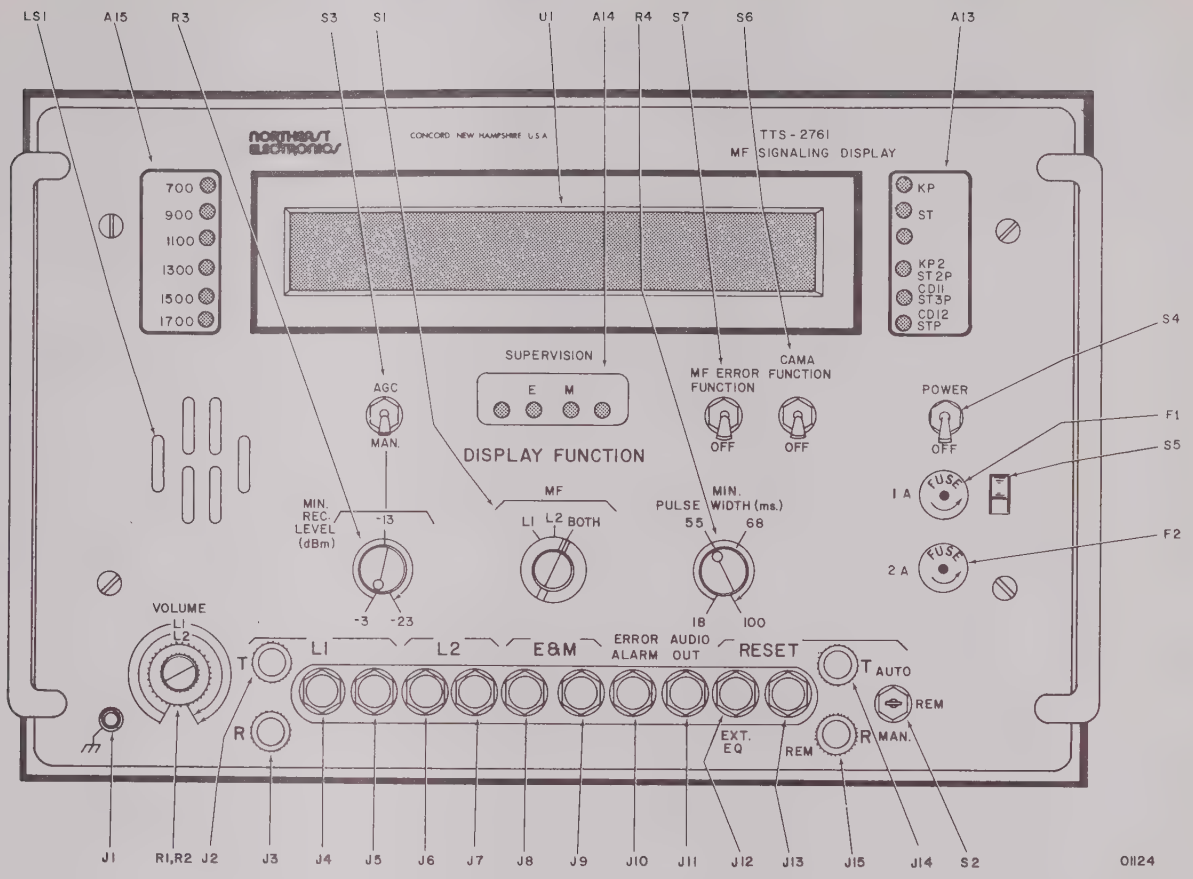


Figure 3—2. Model 2761R Controls, Connectors, and Indicators.

will remain lit; and the SF lamps will remain extinguished.

3.11 NORMAL CONTROL SETTINGS.

3.12 After performing the operational check, set the Model 2761 controls as follows. These settings are generally acceptable for simple transmission monitoring; use of the various diagnostic aids is described in subsequent paragraphs.

a. Set VOLUME controls R1,R2 to midrange.

b. Set MAN/AGC switch S3 to AGC. This disables MIN REC LEVEL —3/—23 dB potentiometer control R3.

c. Determine number of pairs of transmission wires to be monitored and type of supervision desired, if any. Refer to Table 3—2 for patching and for setting of DISPLAY FUNCTION switch S1.

d. Turn ERROR FUNCTION switch S7 OFF.

e. Set MIN PULSE WIDTH control R4 to 55 ms.

f. Turn CAMA FUNCTION swich S6 (Excluding Options 4 and 5) to OFF.

g. Set RESET switch S2 to AUTO position.

3.13 NORMAL TRANSMISSION OBSERVATION.

3.14 No further adjustment of the controls is necessary in order to display normal MF transmission, unless the pulse widths of the tones are shorter than the setting of the MIN PULSE WIDTH control R4, in which case an adjustment in the counter-clockwise direction may be required. E lamp off = E off-hook; M lamp off

Table 3—2. Patching and Basic Control Positions for Two-Wire and Four-Wire Operations.

TYPE OF SIGNALING	SUPV.	NO. PAIRS	DISPLAY FUNCTION SWITCH S1 POSITION	PATCHING NOTES 1,2		CAMA FUNCTION SWITCH S6 POSITION	SUPERVISION LAMPS AFFECTED
				FROM 2761	TO PATCH BAY		
1) MF	E&M	1	L1orL2	L1 or L2 E&M	T1 and R1 E-Lead and /or M Lead	OFF	E and/or M (note 3)
2) MF	E&M	2	BOTH	L1 L2 E&M	T1 and R1 L2 and R2 E Lead and M Lead	OFF	E and M (note 3)
3) MF	SF (note4)	2	BOTH	L1 L2	T1 and R1 T2 and R2	OFF	L1 2400,L1 2600 L2 2400,L2 2600
4) MF-MF (CAMA*)	E&M	1	L1orL2	L1 or L2 E&M	T1 and R1 E Lead and/ or M Lead	ON	E and/or M

NOTES

1. In all cases make connections from the TTS 2761 to the patch bay to maintain continuity in the transmission path. Always use 241 jacks (dual 310) unless bridging monitor plugs are available, in which case single 310 jacks may be used. Otherwise, the transmission path may be opened and an on hook condition imposed.

2. L1 and L2 are continuously monitored for audio reproduction via the speaker or the ACC AUDIO jack.

3. The Model 2761 will function properly without E&M supervision except that the E&M lamps will remain constantly lit.

4. SF detectors are included in Options 4 and 5 only, and are independent of any front panel controls.

5. * See paragraph 3.41 for detailed instructions concerning CAMA trunk monitoring.

= M off-hook. E and M supervision status on MF trunks will be indicated on the E&M lamps regardless of the position of DISPLAY FUNCTION switch S1. If SF supervision is present on either input channel of Options 4 or 5 of the TTS 2761, the proper SF lamp will light. For example, 2400 Hz on L1 = L1 2400 lamp on; or 2400 Hz and 2600 Hz on L2 = L2 2400 and L2 2600 lamps on. The presence of MF codes and digits will be demonstrated by the lighting of the proper pair of lamps for the tone duration. MF code lamps will light after the reception of their respective signals and until reset. MF digits will be displayed in the order received from left to right. If more than sixteen digits are included in any sequence, the seventeenth will replace the first, etc. Switching transients, tones, and speech will be audible on speaker LS1. KP1 tones (KP1 or KP2 in Options 4, and 5), and SF seizure signals (Options 4 and 5 only) will extinguish all code and digital displays; an ST, STP, ST2P,

or ST3P signal latches the digital display to prevent speech from falsely activating digits or symbols (reset commands release the latch). In Options 4, and 5, a latch is caused only by an ST signal.

3.15 AUTOMATIC RESET OPERATION.

3.16 When RESET switch S2 in the AUTO position in MF operations, the digital, frequency, and code lamp displays will be extinguished by a KP1 (KP1 or KP2 in options 4, and 5) signal and, with Options 4 and 5, SF seizure signal. Also, the ST latch is released to enable digital display; and the ERROR ALARM jack tip-ring contacts are no longer shorted by the error alarm relay if an error had previously been detected. If storage of a given transmission is required, the RESET switch should be placed in the REM position.

3.17 REMOTE RESET OPERATION.

3.18 In this mode of operation, the frequency, code, and digital displays will not reset automatically, but only when triggered by a remote or manual reset command. The ST latch function will inhibit clearing of, or MF additions to, the digital display when in this mode of operation, thus storing the last received call until a remote or manual reset command is received. For remote reset operation, connect external reset command source to REMOTE 310 jack J13 or T-R banana jack binding posts J14 and J15. Refer to Specifications for REMOTE RESET commands. Set RESET switch S2 to REM position.

CAUTION

Only a tip-ring closure or a TTL/DTL/RTL logic 0 is required to effect a remote reset. Neither the idle nor active state of the tip input to the REMOTE RESET jacks should exceed TTL/DTL/RTL voltage limits; −0.5 to +5.5 Vdc. Exceeding these limits may cause an internal fuse to blow, disabling the remote reset circuitry.

3.19 DIAGNOSTIC OPERATION IN MULTIFREQUENCY (MF) SIGNALING SYSTEMS.

3.20 The TTS 2761 is helpful in troubleshooting marginal or inoperative MF systems. The line under observation is assumed to be out of service so that a known sequence of MF pulses can be sent at machine or manual rates.

3.21 DETECTING INSUFFICIENT OR EXCESSIVE COMPONENT FREQUENCIES: THE ERROR FUNCTION.

3.22 The TTS 2761 can be used to determine when only one or more than two frequencies in an MF signal are being transmitted simultaneously.

3.23 When ERROR FUNCTION switch S7 is OFF, frequency lamps light for the duration of tone presence at the input jack. If any signal occurs in which the number of component MF frequencies is other than two, or in which either frequency is faulty with respect to level or bandwidth, then MF decoder A8 ignores that input, and no digital or code display is presented. However, any frequency lamp will light if the proper tone is within the limits of level and bandwidth. If a known sequence of digits is sent at manual send speeds, the absence of proper lamp pairs may be observable; at machine sender speeds, however, (up to 20 pulses per second) correct diagnosis may be impossible to achieve by lamp observation. The Error Function circuitry enables the operator to quickly and accurately identify missing or extra frequencies in any MF tone bursts lasting longer than about 12 milliseconds.

3.24 As shown in Figure 3−3, the indication of any MF tone(s) from the detectors initiates a sequence of events which is continued when the ERROR FUNCTION Switch S7 is on. A $\overline{CLK}$ pulse from the Decoder A8, signifying the presence of correct two-and-only-two -out-of-six MF, cancels the error sequence if it occurs within four milliseconds of the start of either component frequency. The reception of any start pulse (ST in options 4, or 5; ST,STP,ST2P, or ST3P in other versions) since the last reset command will also cancel the error sequence in order that speech and switching transients will not cause false error indications. If all error conditions are met for a given tone, then the error strobe forces the digital display U1 to exhibit a colon, activates the Error Alarm Relay, and, if no other error has occurred since the last reset command, freezes those frequency lamps on whose corresponding tones were present at the time of the error strobe. If a previous error had been registered, then an additional colon would be generated but no additional frequency lamps would be held on. The subsequent reception of proper MF would be exhibited via the corresponding digit or colon and the proper frequency lamps would be held on only for the duration of the tone.

3.25 EXAMPLES OF ERROR FUNCTION OPERATION.

3.26 Suppose the Model 2761 presents the following information after an MF transmission: 1300 Hz lamp lit; KP and ST lamps lit; digital display reads "0::6:6::5:6." Assuming the error is consistent in any one transmission, one can eliminate from consideration those frequencies present in the codes (KP and ST) and digits (0,5,6,) which did decode properly (see Table 3−3). By

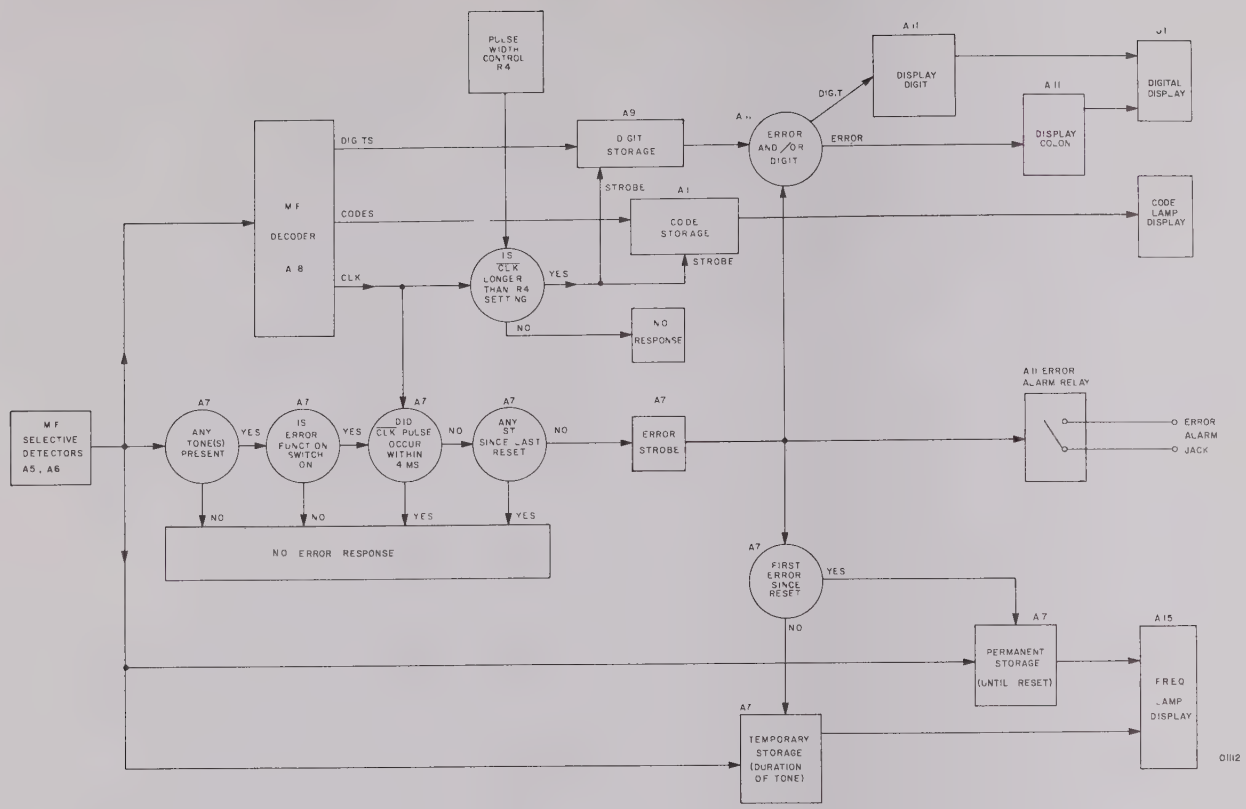


Figure 3—3. Model 2761 MF Error Sequence Flow Chart Diagram.

deduction, the 700 Hz sender is inoperative, since 700 is the only frequency not a component of 0,5,6,KP, or ST. Now suppose the Model 2761 presents the following information: 700,1100, and 1300 Hz lamps lit; KP code lamp on only; digital display reads, 22:::66. Assuming a consistent error and by checking the component frequencies of the code (KP) and digits (2 and 6) which did decode properly, one finds that 1100 Hz is the only frequency common to all three and is also one of the frozen lamps. Therefore, the 1100 Hz sender is being activated for every pulse.

3.27 Interpretation of Error Indications. The aforementioned error indications may result from many sources, some of which may not result in erroneous transmissions due to register discrepancies. For example, transmission line MF receivers may be far more tolerant of transmission level differences (e.g., twist), bandwidth, or compound frequency tolerance (delay in start between two component frequencies of a given MF signal) than is the Model 2761. For example, R1 specifications indicate a maximum receiver compound frequency tolerance of ± 6 milliseconds. If, on an acutal trunk, the 'start delay' exceeds four milliseconds, the Model 2761 will declare an error present while MF registers may accept the signal.

3.28 DETECTING EXCESSIVE DIFFERENCE IN TRANSMISSION LEVELS OR TOO LOW COMPOUND SIGNAL LEVELS.

3.29 If particular MF signals, or groups of signals using a common frequency, fail to register correctly even on manual sending, one or more of the MF frequencies may be significantly lower than the others in amplitude. If registration is generally erratic, even on slow manual sending, the signals may all be too low in amplitude. The automatic gain control of the 2761 will enable the reception of signal levels from −25 to +6 dBm (−30 to +1 dBm in options 2,3,4, and 5).

3.30 Connect the Model 2761 to the line in question, as described in paragraph 3—12. Using a manual sender, slowly transmit a known sequence of MF signals including all digits. Observe the frequency lamps during signal transmission and check for proper lamp pairs lighting during transmission of their associated frequencies (refer to Table 3—3). If the expected display for the known sequence of MF is in error, excessive transmission level differences may be present. That is, one or more of the frequencies in any pair may be 6 dB or more below its compliment (due to twist, differences in sender output levels, etc.).

3.31 When the proper transmission level on the trunk is known, check the frequencies as follows: set AGC/MAN switch S3 to MAN position; set MIN REC LEVEL control R3 slightrly lower than proper transmission level (e.g., proper level = −12 dBm; set MIN REC LEVEL control to approximately −14 dBm). Transmit a known sequence of MF signals, representing all digits and at least one code. While the known sequence of MF is being transmitted, observe the frequency lamps to determine which MF signals include a frequency too low in level to be displayed. The error function may be employed to investigate failures of this type if the send rate is too high.

3.32 For example: MF signals KP, 1, 3, 6, 0, CD11/ST3P, ST are transmitted. The display shows KP, 1, 0, CD11, and ST. Digits 3 and 6 were not displayed and are found (Table 3−3) to have a common frequency of 1100 Hz which is not part of any code or digit which did decode properly. Therefore, the 1100 Hz sender is generating a signal considerably lower in level than the other component frequencies of digits 3 and 6 (900 Hz and 1300 Hz).

3.33 Since the frequency levels may be staggered, the best test is to receive in the Model 2761 a known sequence of transmitted MF signals representing all possible codes and digits recognized by the instrument.

3.34 If the proper transmission level on the monitored trunk is unknown, set the MIN REC LEVEL control to −23 dB and slowly rotate the control counterclockwise during transmission until an inconsistent display is obtained. Note the codes or digits which failed to register properly; then turn the control clockwise until the same codes and digits are displayed consistently. The position of the MIN REC LEVEL control will indicate the approximate level of the codes or digits noted.

3.35 NOTE. The lower signal level threshold of the unit is more sensitive than the upper threshold. For example, with the MIN REC LEVEL control set at −10 dB, a signal of −13 dBm would probably not be accepted, whereas a signal level of −7 dBm would.

3.36 DETECTING SHORT MF PULSES (MACHINE SENT).

3.37 If MF signaling errors are noted on machine-pulsed numbers, but not on manually pulsed numbers from the same MF oscillators, too short a pulse width may be the cause. The Model 2761 may be used to determine if short pulses are being sent or received. Since channel distortion is possible, a valid transmitted signal from office A does not guarantee a valid received signal at office B, however. Both ends of the circuit should be checked.

3.38 To check for short MF pulses and/or the approximate length of any MF signal pulses, proceed as follows: connect the Model 2761 to one end of the line in question as directed in paragraph 3.12. Transmit a known sequence of MF signals representing all digits from the suspect sender. Any signal having a pulse width shorter than the setting of MIN PULSE WIDTH control R4 will not be decoded and displayed. Repeat the transmission several times, each time adjusting the MIN PULSE WIDTH control clockwise by a small increment, which increases the minimum pulse width required by the instrument for display of any MF signal. In this manner the approximate pulse width of each pulse sent can be determined.

3.39 SF (VF) FILTERS.

3.40 The Model 2761, Options 4 and 5, are equipped with 2400 and 2600 Hz filters for each input channel. These filters have a maximum sensitivity of −30 dBm to compound SF and −25 dBm to single SF. Each filter drives a lamp on the SUPERVISION display on the front panel. Tone present = lamp on. Filter and lamp operation is not affected by any of the front panel controls. The outputs of the filters perform only one function besides driving lamps: generating a reset command upon receipt of an SF seizure signal. When L1 is monitoring the send path and L2 the receive, and an SF seizure signal occurs for at least 95 milliseconds, then a system reset occurs if RESET switch S2 is in the AUTO position. The Model 2761 defines SF seizure as 2400 Hz (but not 2600) present on L1 and 2600 Hz (but not 2400) present on L2 for a period of at least 95 milliseconds.

3.41 OPERATION IN CAMA SYSTEMS.

3.42 The Model 2761 can be used to monitor ANI/ONI (Automatic/Operator Number Identification) transmissions on CAMA (Centralized Automatic Message Accounting) trunks.

3.43 The anticipated sequence of data which the Model 2761 will decode and display is as follows:

a. Off-hook (E&M).

b. Address MF (KP1, 7 or 10 digits, ST or STP or ST2P or ST3P).

c. Wink pulse (if any), the 140 ms off-hook/on-hook/off-hook transition; or off hook toward local office.

d. KP1.

e. One information digit, 0-7 (MF).

f. Calling number (seven MF digits).

g. ST.

h. Answer supervision (E and M off hook).

3.44 **DATA INTERPRETATION.**

3.45 Interpret the data as follows:

a. Digital Data. Presented from left to right across the numeric display as received. If more than 16 digits are received before a reset command is issued, the seventeenth digit replaces the first, the eighteenth digit replaces the second, etc. .

b. MF Frequencies and Codes. The frequency lamps will remain lit for the duration of the tone present. The codes will activate the proper lamps when present. These code lamps will remain lit until reset.

c. Line Status. The SUPERVISION lamps reflect the status of lines attached to the front panel jacks. Off-hook may be observed by the negative logic operation of the E&M lamps.

3.46 **CONNECTIONS, CONTROL SETTINGS AND OPERATION.**

3.47 Set the controls as follows:

a. Set the VOLUME controls R1 and R2 to mid-range.

b. Set the MAN/AGC switch S3 to AGC.

c. Turn the ERROR FUNCTION switch S7 to OFF.

d. Set the MIN PULSE WIDTH control R4 mid-way between 12 and 55 ms.

e. Push the POWER switch S4 to ON.

f. Connect tip and ring to L1 (J4, J5 or J2 and J3).

g. Connect the E and/or M lead, when appropriate, to the E&M jacks J8 and J9.

h. Set the DISPLAY FUNCTION switch S1 to L1 and CAMA FUNCTION switch S6 to up position.

i. Set the RESET switch S2 to the MAN position momentarily and leave in REM position.

The instrument is now poised to interpret CAMA trunk signaling. A manual or remote reset command will be necessary after each full transmission to clear all displays and release the ST latch feature. In the up position of the CAMA FUNCTION switch, the instrument is programmed to latch on the second start (ST or STP or ST2P or ST3P) signal received after a reset command rather than on the first.

3.48 **EXAMPLES OF CAMA OPERATION.**

3.49 The following sequence of data is presented as an example: KP 603 2247466 ST2P wink KP 3 5201612 ST. After the first series of digits has been received, the displays will read as follows: KP and ST2P code lamps on, digital display "6032247466 ". The wink pulse, if any, present on the E&M leads, will then be observed on the E&M lamps. The final digital display will read, "1232247466352016," the seventeenth and eighteenth digits having replaced the first and second. The instrument must now be reset by momentarily depressing RESET switch S2 to the MAN position and releasing to clear the displays and override the ST latch. Reset may also be accomplished remotely (see paragraph 3.18).

Table 3—3. Multifrequency Signaling Recognized by the Model 2761.

DIGIT	FREQUENCIES (Hz)
1	700 + 900
2	700 + 1100
3	900 + 1100
4	700 + 1300
5	900 + 1300
6	1100 + 1300
7	700 + 1500
8	900 + 1500
9	1100 + 1500
0	1300 + 1500

CODE	FREQUENCIES (Hz)	EXPLANATION	SYSTEM
KP	1100 + 1700	Prepare for Digits	
Coin Return	1100 + 1700	Coin Return	Coin Control
KP1	1100 + 1700	Prepare for Digits (Terminal Call)	CCITT # 5
ST	1500 + 1700	End of Pulsing Sequence	
STP	900 + 1700		TSPS
CD12	900 + 1700	Delay Operator	CCITT # 5
ST2P	1300 + 1700		TSPS
KP2	1300 + 1700	Prepare for Digits (Transit Call)	CCITT # 5
ST3P	700 + 1700		TSPS
Ringback	700 + 1700	Ringback	Coin Control
CD11	700 + 1700	Inward Operator	CCITT # 5
Coin Collect	700 + 1100	Coin Collect	R1

Table 3—4. Glossary of Equivalent Terms For R1 and CCITT# 5 Signaling Systems.

R1		CCITT # 5	
TERM	**MEANING**	**TERM**	**MEANING**
MF	multifrequency	MF	multifrequency
SF	single frequency line signaling	VF	voice frequency
SF1	2400 Hz	VF	2400 Hz line signal
SF2	2600 Hz	VF	2600 Hz line signal
DP	dial pulse	DP	dial pulse
on hook		on hook	
off hook		seizure/answer	
supv	supervision	supervisory	line supervision
E&M		none	
CAMA	Centralized Automatic Message Accounting	none	
ANI/ONI	Automatic/Operator Number Identification	none	
TSPS	Traffic Service Position System # 1	none	
WECO 310 jack	tip and ring	BPO plug 316	tip and ring
dBrn	noise level	dBm	= dBrn—90dB
STP,ST2P, ST3P	start pulses for various CAMA calls for TSPS	none	
none		CD11,CD12,KP2	inward/delay operator,transit call digit preparation

SECTION 4

CIRCUIT DESCRIPTION

4.1 INTRODUCTION.

4.2 The circuit descriptions appearing in this section are written on a functional block diagram level. The active components contained within the functional blocks are identified by their reference designators and are easily cross-referenced to the appropriate detailed schematic diagram in Section 7. The block diagram level description is based on functional block diagrams of the overall schematic diagram, Figure 7—1. They represent the signal processing involved in audio reproduction and two major modes of operation. The block diagram level descriptions are followed by a detailed circuit description keyed to the block diagrams and schematic diagrams.

4.3 BLOCK DIAGRAM DESCRIPTION.

4.4 REPRODUCTION OF AUDIO.

4.5 Referring to Figure 4—1, the signals appearing on the L1 and L2 inputs are monitored at all times via two high-impedance, dc-blocked, balanced transformers. The signals are then applied to two separate high-pass filters. At this point, the signals are also routed to transmission gates through two MF amplifiers, where MF signaling can be selected to be processed for display.

4.6 After the high-pass filters, the signals are amplified and applied to voltage dividers incorporating two volume controls, R1 and R2. The signals are summed, amplified, and routed to speaker LS1 and an attenuator. The output of the attenuator is connected to ACC AUDIO jack J11.

4.7 MF SIGNALING WITH E&M SUPERVISION.

4.8 DISPLAY FUNCTION switch S1 connects either or both input channels L1 and L2 by applying the proper control voltage for the FET transmission gate on A3, as shown in Figure 4—2.

4.9 Any MF tones present on L1 or L2 are passed through a high-pass filter on A2 to both automatic and manual gain control circuits (A2 and A3). Minimum threshold for manual operation is provided by MIN REC LEVEL potentiometer R3. Choice of gain control is provided by AGC/MAN switch S3.

4.10 Six sets of bandpass filters with level detectors on A5 and A6 translate the MF tones to six-line, positive TTL logic (e.g., for the 700 Hz line, 5 Vdc = 700 Hz tone present, 0 Vdc = 700 Hz absent). This conversion is the end of analog processing.

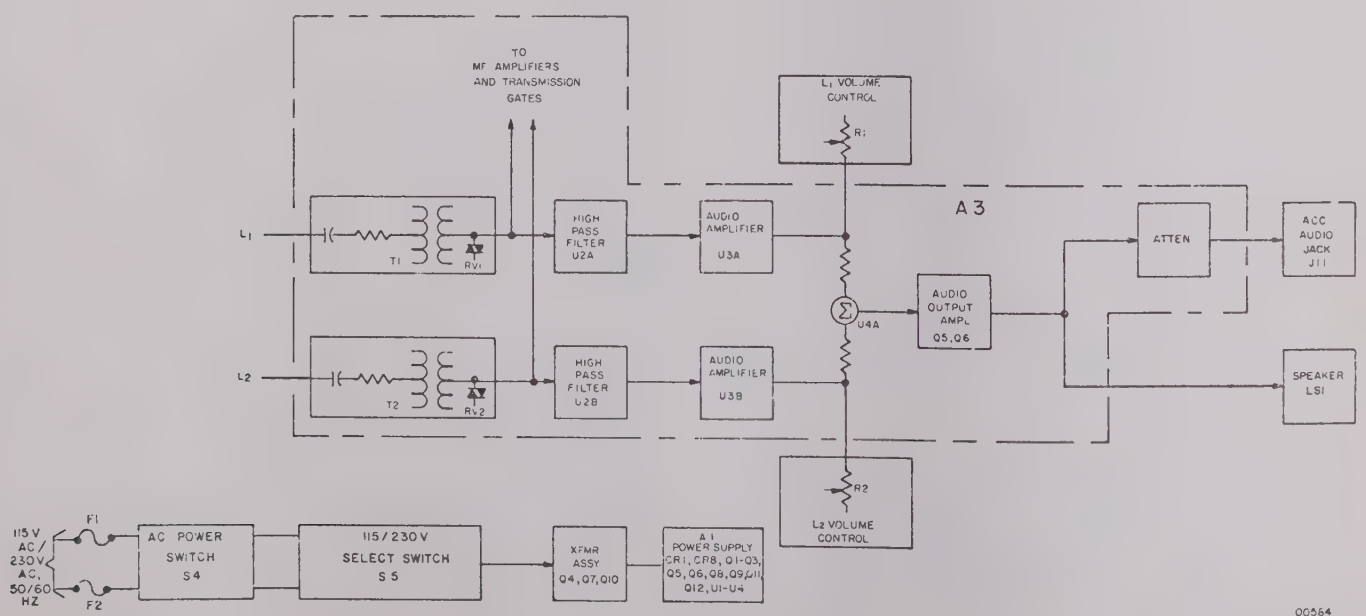


Figure 4—1. Model 2761 Audio Processing and Power Supply Block Diagram.

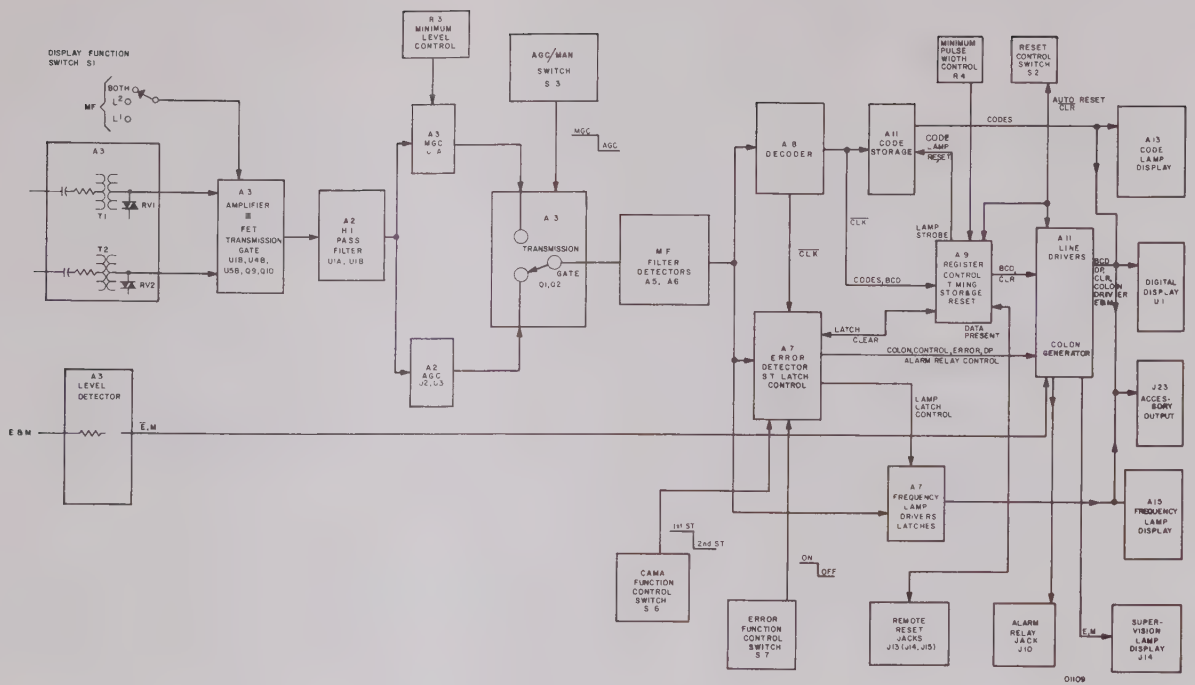


Figure 4—2. Model 2761 MF Signal Processing with E and M Supervision Block Diagram.

4.11 Digital processing starts with the six lines of frequency logic being simultaneously presented to MF Decoder A8, the Frequency Lamp drivers on A7, and the Error Detector on A7.

4.12 Decoder A8 translates the six-line frequency logic to digits or codes. The digital information is passed in BCD format to Register A9. The codes are stored in latches on A11 and displayed via lamps on A13 after a strobe pulse from Register A9. The Decoder also generates a clock pulse ($\overline{CLK}$) when any frequency combination is a proper two-and-only-two-of-six condition. This $\overline{CLK}$ pulse is passed to Register A9 for signal timing and to the Error Detector circuitry on A7 as a no error indication.

4.13 The Frequency Lamp Drivers on A7 activate the lamps on A15 for the duration of an input tone or upon an error indication from the ERROR DETECTOR circuitry, until reset.

4.14 The Error Detector, when enabled by ERROR FUNCTION control switch S7, times any MF frequency. If a $\overline{CLK}$ pulse (signifying proper 2/6 MF) is not generated on Decoder A8 four milliseconds after the start of the digital signal, an error data present pulse is generated. This freezes all frequency lamps on at the time of the error lit until reset; signals the Colon Generator on A11 to print a colon (:) on digital display A1; and activates the Error Alarm circuit on A11. Average filter and instrument delays (approximately 8 milliseconds) and the error integrity check interval (approximately 4 milliseconds) prescribe the minimum error pulse width of the instrument (approximately 12 milliseconds).

4.15 A7 includes the ST latch circuit. Normally, after reception of an ST signal, subsequent MF digits are ignored by the digital display until reset. When CAMA FUNCTION switch S6 is in the ON position, the ST latch circuit does not inhibit digital signals until two ST signals have been observed. This allows both portions of a CAMA MF-MF sequence to be simultaneously displayed.

4.16 Register A9 compares the length of all $\overline{CLK}$ pulses from the decoder to the setting of MIN PULSE WIDTH control R4. When the $\overline{CLK}$ pulse width exceeds the setting of R4, a lamp strobe activates the lamps for any code stored on A11. A digit present pulse is also generated to gate BCD information stored on A9 (from Decoder A8) to digital display U1, where the digit is placed in proper position.

4.17 Buffer A11 includes error alarm relay K1, which provides a dry contact closure rated at 250 Vac, 1 ampere to ALARM RELAY jack J10. The closure lasts from error detection to reset and is suitable for lamps, buzzers, or other alarm devices.

4.18 Buffer A11 also includes the colon generator and line drivers for both digital display U1 and accessory output connector J23. These drivers convey BCD, digit present, error present, and clear information.

4.19 Reset switch S2 allows flexibility in display-clear sequences. The Model 2761 erases all digits, codes, error indications, and latches via a negative-going signal on any of the CLR network lines. The source of this signal can be: a manual reset of S2; a remote reset with S2 in any position via REMOTE RESET jacks J13-15 or Accessory Connector J23; automatic with S2 in AUTO from a KP/KP1/KP2 pulse or (options 4 and 5) from an SF seizure signal. EXTERNAL EQUIPMENT jack J12 can be used to reset auxiliary equipment after a remote or manual reset.

4.20 E&M supervision is accomplished by monitoring the E&M leads with two separate dc-coupled, level-detector circuits. The detectors monitor the E lead for ground and the M lead for an open or central office battery. Their outputs (E,M) are routed to the lamp drivers and relay circuit on A11. The drivers extinguish the appropriate lamp(s) (E,M) on A14.

4.21 MF SIGNAL PROCESSING WITH SF SUPERVISION (OPTIONS 4 AND 5).

4.22 The Model 2761, options 4 and 5, detects and displays 2400 Hz and 2600 Hz tones present on L1 and L2 via lamps on Supervision Board A14. In order to maintain SF channel identification, dual, high-pass filters and AGC circuits are required (Figure 4—3). SF Detector A4 contains the four required filters, level detectors, and lamp drivers. The output of the high-pass filters on A2 is summed and routed to a manual gain control circuit on A3. The outputs of the dual AGC circuits are summed on A3 and connected to the transmission gate on A3. All other aspects of processing are identical to paragraphs 4.7 through 4.20.

4.23 DETAILED CIRCUIT DESCRIPTION.

4.24 Paragraphs 4.26 through 4.84 provide the detailed circuit descriptions of A2 through A17. All descriptions are in reference to their respective schematic diagrams located in Section 7 of this manual.

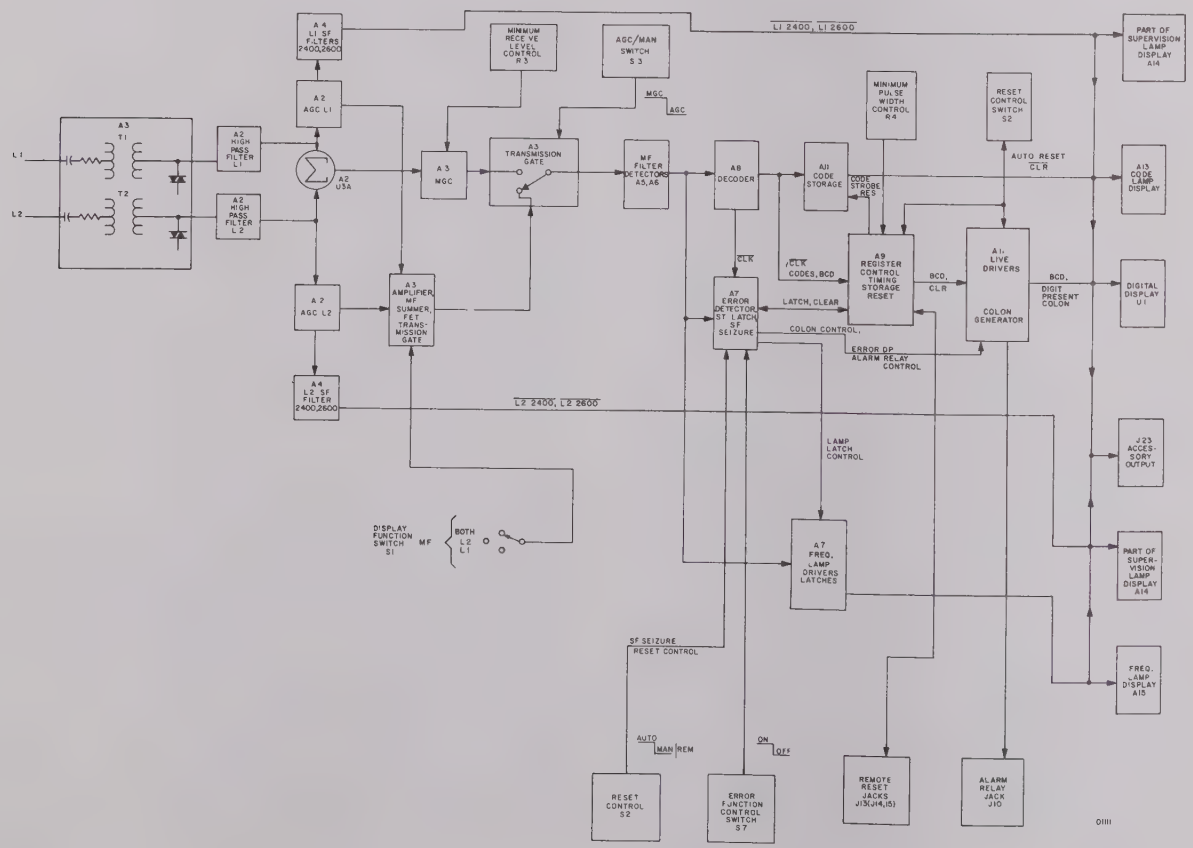


Figure 4—3. Model 2761 MF Signal Processing with SF (VF) Supervision Block Diagram.

4.25 A better understanding of the circuit functions in relation to the whole unit can be obtained by cross-reference to the overall schematic diagram in Section 7, and the block diagrams discussed in the preceeding text of this section.

4.26 MF INPUT (AGC) A2 (Options 0-3).

4.27 The functions of the AGC board are two-fold: to subject input signals to a high-pass filter and to provide a relatively stable output level for the bandpass filters on A4, A5, and A6 for any input level within a 30 dB dynamic range.

4.28 Refer to schematic diagram Figure 7—3. Integrated circuit U1 provides a four-pole active high-pass, filter with an in-band gain of approximately 0 dB for suppression of power line interference and harmonics. The cutoff frequency is approximately 380 Hz.

4.29 The output of the high-pass filter is routed to a manual gain control (MGC) on A3 and to the AGC on A2. Choice of MGC or AGC is made by means of front panel MAN/AGC switch S4, which controls a transmission gate on A3.

4.30 The AGC circuit maintains nearly constant output amplitude over approximately 30 dB of input signal variation. This provides the filters and detectors on A5 and A6 with a nearly constant input, maintaining their characteristics over the full dynamic range of the unit.

4.31 AGC is achieved by varying the feedback path around U2A with the drain-source resistance of Q1. With no signal present, Q1 is turned on through R16. Its low drain-source resistance and R14 form an attenuator that reduces any ac feedback to U2A-2 by approximately 30 dB. Any signal received is amplified at full gain and is coupled through C8 to two of the four inputs of U3. If the signal peaks exceed the offset voltages set up by divider chain R21, R23, R25, R27 and R28, the normally off sections of the two differential amplifiers in U3 will conduct; on the positive peak and on the negative peak. Since both conduct through R18, a greatly amplified full-wave rectified, negative-going signal appears across R18. The gate of Q1 is rapidly pulled negative increasing the channel resistance and decreasing the gain of the stage.

4.32 The circuit reaches a steady state within two or three cycles of signal at such an output level that the amplified peaks just exceed the offset voltages set by the divider. The circuit returns to its original state over a much longer time (hundreds of milliseconds) controlled by R16 and C7.

4.33 A normally-open FET switch is used to block idle line transients and initial surges caused by high-level signals from the filters. The incoming signal amplitude must be sufficient to drive the gate voltage of Q1 more negative than an adjustable reference voltage set by R33 before the switch will close. Resistors R31 and R32 provide a slight positive feedback around comparator U2B to prevent chatter. Thus, in addition to blocking initial transients, the circuit establishes a fairly precise threshold below which signals will not be processed.

4.34 DUAL AGC A2. (Options 4 and 5 only).

4.35 The AGC used in options 4 and 5 of the Model 2761 includes two circuits identical to that described in paragraphs 4.27 through 4.33. The need for a double AGC is manifested by the requirement to monitor SF frequencies on both input channels simultaneously and distinguish by LED operation which frequency (frequencies) are present on which channel. The four SF filters depend on a relatively stable input with respect to amplitude to maintain the required narrow bandwidth. Summing amplifier U3A is included to route the high-pass filter outputs to the manual gain control circuit of A3, and subsequent MF detection and decoding.

4.36 MF AND SF DETECTORS A4, A5, AND A6.

4.37 The amplified MF signal from A3 (MF Out) has a level of approximately —27 dBm. It is routed to six parallel-connected MF pass band filters-detectors located on A5 and A6. The outputs from the dual AGC on A2 of Options 4 and 5 also have a level of approximately —27 dBm and are connected to the two pairs of SF passband filter-detectors located on A4. All ten filters have a similar construction as shown in Figures 7—6 and 7—7. U1, U3, and U5 (and U7 on A4) compose pass-band filters while U2, U4, and U6 (and U8 on A4) are level detectors. The final stage of each detector is two (one per A4 detector) level shifting transistors.

4.38 Consider the circuit consisting of U1 and U2 (A5 and A6). The resonant frequency of each section of the filter (U1A, U1B), connected by a strap from pin 5 to pin E, is determined by the Wien-type network associated with it. For U1A, the network is R5, R6, R7, C2 and C3. The Q of this section is controlled by feedback network R2, R3, and R4. The fraction of the filter output routed to threshold detector U2, and thus the input level at which the detector will trip, is set by R15. The detector circuit is basically a feedback, full-wave bridge consisting of U2A, CR1, CR2, C7, C8, R16, R17 and C6 with a fixed dc offset established by R21 and R18. When the average value of the full-wave rectified signal exceeds the offset voltage, the output of U2B goes from low to high and drives Q1 on.

4.39 The four output transistors on A4 directly drive LEDs on A14 and are also connected to the SF seizure signal detector on A7 (Options 4 and 5 only). A second transistor stage on each detector output of A5 and A6 inverts the signal polarity and allows for direct interface with the TTL circuits on Decoder A8 and Error Detector A7.

4.40 **MAIN INPUT A3.**

4.41 The main input board provides the following:

a. Two high-impedance, balanced, dc-blocked inputs for line 1 and line 2.

b. Circuitry for MF channel selection.

c. Speaker driver and volume controls (along with front panel controls) for L1 and L2.

d. High input-impedance level detector for the E&M inputs.

e. Manual gain control circuitry for MF signals.

f. External equipment reset feature.

4.42 As shown on schematic diagram Figure 7—5, T1, R28, C11, and T2, R20 and C12 provide two independent, high-impedance, balanced, dc-blocked input channels for bridging and monitoring MF signaling or audio range sound reproductions via speaker and AUDIO ACC jack J11. Varistors RV1 and RV2 provide transient protection in the transformer secondaries.

4.43 U1B and U4B provide MF signal isolation between input channels L1 and L2. According to the position of DISPLAY FUNCTION switch S1, transmission gate Q9 and Q10 switches through to U5B signals from either or both input channels. U5B and R51 provide for 0 dB gain from RV1 to test point TP3.

4.44 Signals from the L1 and L2 inputs are also routed through separate high-pass filters to identical audio amplifiers, attenuated by L1 and L2 VOLUME controls R1 and R2, summed, and amplified again by the audio output amplifier. The combined audio is fed to the speaker and, by twisted pair, to AUDIO ACC jack J11.

4.45 The E&M inputs provide high-impedance level detectors to monitor and interpret E&M (line and drop) conditions. The E level detector reflects an on-hook condition for an input voltage more negative than approximately −9.9 Vdc, or when the input is open. When a ground or a dc voltage more positive than −9.9 V is applied to the input, Q3 switches on. The output lead enables the drivers on A11 for the E lamp (the instrument defines this input as an E off-hook condition).

4.46 The M level detector reflects an on-hook condition for input voltages more positive than approximately −22.6 Vdc, or when the input is open. When central office battery or a dc voltage more negative than approximately 23V is applied to the input, Q4 switches off. The output lead enables the drivers on A11 for the M lamp (the instrument defines the input as an M off-hook condition). The E lead corresponds to drop and is connected to both J8 tip and J9 tip. The M lead corresponds to line and is connected both to J8 ring and J9 ring.

4.47 The MF input signals to L1 and L2 from A3 are applied through pin C to the high-pass filters on A2. After being filtered, the signal appears at the input of the AGC and, via pin 6 (MF HP Out) on A2 to the input of the manual gain amplifier on A3. Both the AGC and the manual gain control circuit outputs are routed to transmission gate FETs Q1 and Q2 for selection.

4.48 If MAN/AGC switch S3 is in the AGC position, a +12 Vdc signal is applied to the gates of transmission gate FETs Q1 and Q2. This switches the AGC output of A2 through to pin 5 (MF Out) A3, and to selection detectors. If the MAN/AGC switch is in the MAN position, then a −12 Vdc signal is applied to the gates of transmission gate FETs Q1 and Q2. This switches the manual gain control circuit output to pin 5 (MFOut) and to MF detectors.

4.49 The manual gain control circuit employs current-control of diode resistance in the input and feedback path of amplifier U1A. If the manual gain control input voltage is 0, both diodes CR3 and CR4 are reverse biased and the stage gain is unity. If the manual gain control input voltage goes positive, CR4 is reverse biased but CR3 conducts. The dynamic resistance of CR3 and resistor R4 form an attenuator that reduces the feedback signal to U1A-2 by up to 10 dB, thus increasing stage gain by up to 10 dB. If the manual gain control input voltage goes negative, CR3 is reverse biased but CR4 conducts, decreasing the input signal amplitude and stage gain by up to 10 dB.

4.50 The remote reset input is routed through a current-limiting circuit consisting of F1, R53, and CR10 and CR11. The purpose of the circuit is to protect the various TTL reset gates from voltages outside TTL levels via CR11 and CR12 while F1 limits the current to 125 milliamperes. This circuit and the manual contact of the RESET switch are directly routed to external equipment reset relay driver circuitry Q7 and Q8. This driver energizes K1 to provide an isolated contact closure to reset accessory equipment (e.g., the TN 76 or

TTS 2776) whenever the Model 2761 receives a remote or manual reset command.

4.51 Straps are added (A-B, C-D) to route the inputs from either channel directly to the MF summer and gate (U1B, U4B, U5B, Q9, Q10) and subsequently to the AGC. In options 4 and 5, the strapping is changed to A-a, B-b, C-c and D-d. This change routes the two channel inputs directly to the special dual AGC of options 4 and 5 in order to maintain channel identification internally for the two sets of SF detectors. The outputs of the dual AGCs are routed back to the summer and gate of A3 for MF operations.

4.52 **MF DECODER A8.**

4.53 The MF decoder scans six outputs of the selective detectors on A5 and A6 and decodes these TTL signals to one of the five codes or ten digits recognized by the Model 2761.

4.54 Two and only two of six frequencies are required for an MF code or digit. When only one, or more than two, frequencies are simultaneously present, then no logic output is generated by A8.

4.55 The outputs include negative logic forms of the MF codes: KP/KP1, ST, KP2/ST2P, CD11/ST3P, and CD12/STP. These outputs are directly routed to card 11 to await a lamp strobe signal from A9 to enable lamp activation.

4.56 The MF digits are decoded directly to a BCD format and routed to A9 for gating to the numeric display after a timing check.

4.57 Other signal outputs include a positive logic KP, ST, and a CD11 + CD12 to perform various functions on the register circuitry on A9.

4.58 The $\overline{\text{CLK}}$ output of A8 provides a logical zero signal for the duration of any legitimate MF code or digit. This pulse interval is compared on the register card to the setting of the MIN PULSE WIDTH control and if shorter, rejected.

4.59 **ERROR DETECTOR A7.**

4.60 Frequency lamp drivers U11A, U11B, U11C, U12A, U12B, and U12C accept various combinations of MF inputs from MF detectors A5 and A6 in the form of TTL signals and invert them to drive LEDs on Frequency Lamp Board A15. The gates are open-collector to allow simultaneous lamp activation by U11D, U11E, U11F, U12D, U12E and U12F in case of error signals.

4.61 Error/Detector (U3, U5B, etc.) also monitors the MF inputs. If the error function control is high, any MF causes a 4-millisecond waiting period at U3A. If a $\overline{\text{CLK}}$ pulse from Decoder A8 does not appear for the entire one millisecond signal from U3B (which occurs after the waiting period), then an error signal is generated at TP6. The $\overline{\text{CLK}}$ pulse signifies 2 and only 2 out of 6 MF or correct MF. U5B, if not latched by an ST via pin 13, generates complimentary 30-millisecond output pulses to drive numeric display U1 and colon generator for every MF error. For the first error received after a $\overline{\text{CLK}}$ command, flip-flop U4A/U4B is set, driving an external alarm relay on A11 and triggering the six D flip-flops on U13, transferring the active MF inputs to U11D, U11E, U11F, U12D, U12E and U12F. Thus, those lamps on at the time of an error indication are held on until U13 is cleared via a CLR command. Errors subsequent to the first one after a CLR command cannot change the state of flip-flop U4A/U4B and thus do not latch additional lamps.

4.62 The single/double ST latch circuit (U10, etc.) responds to the first (L = 1) or second (L = 0) ST signal and ST timing indication received at pins 12/N and 13/P after a CLR command (8/J). The counter U10 is set to zero by a CLR via U6D and counts either one or two ST inputs. Gates U7D and U4C prevent additional counts from reaching U10 and changing state after an ST latch indication. U2B and U2C are open-collector outputs driving the output M and latching U5B to prevent error talkup which might occur from speech induced filter transients.

4.63 The SF seizure detector (U9, U9, etc.) presents outputs at TP5 and pin B only for the following conditions:

a. Logic 1 at 4 & D (send 2400, receive 2600)

b. Logic 0 at 9 & 7/H (no send 2600, no receive 2400)

c. Duration of 100 milliseconds (constitutes SF seizure in CCITT # 5 systems)

4.64 A logic one at TP4 triggers one-shot U8 causing that package to generate a 90-millisecond pulse to J-K flip-flop U9. At the end of the pulse, the Q output of U9 causes U8B to generate 30-millisecond signals at its Q and $\overline{\text{Q}}$ outputs. The negative pulse is passed from the board via pin B and the positive pulse gates U2D if the unit is in the AUTO RESET mode (K = 1) and generates a CLR command. If the conditions for seizure listed above do not last for 90 milliseconds, the output of U8 is cancelled. The resulting negative transition at U9-12

does not clock U9 since the clear command effected at pin 2 by the change in state at TP4 overrides the $\overline{CLK}$ input and the entire sequence of 90 milliseconds with proper input logic conditions must be begun again.

4.65 **MF REGISTER A9.**

4.66 The functions of the Register card are limited to MF operations and include: timing of input data pulse widths compared to the setting of MIN PULSE WIDTH control R4 setting; KP reset command detection and conversion; temporary storage of digit data in BCD format; and data present pulse generators for the digital and code lamp displays.

4.67 Presence of proper MF is signified by the $\overline{CLK}$ pulse from Decoder A8, which can be observed at TP1 on Register A9. Transistor Q1 is cut off for the duration of the $\overline{CLK}$ pulse, allowing capacitors C1 and C2 to charge toward +12 Vdc. It the interval is long enough to allow the current through MIN PULSE WIDTH control R4 to charge C1 and C2 to the turn-on level of Q2, a positive-going pulse will be present at TP3, triggering U3. This generates a 10-microsecond, positive going data present pulse observable at TP4. This data present pulse performs four duties: triggers the single/double ST counter on Error Detector A7 if an ST signal is also present; enables one input of KP Reset gate U1B; enables digit present gate U6C if a code is not indicated via U5; and, with its trailing edge, triggers U2B, the lamp strobe for the code lamps.

4.68 If Reset switch S2 is in the AUTO position, Q3 is turned on via pin 9K, and U1B-3, the KP reset gate, is high. If a KP pulse is indicated via pin 4 and a data present pulse occurs at pin 5 simultaneously, then a KP reset pulse occurs. This signal resets registers U8 and U9 via U4F and also the code lamps via U4E and U4C (which increases the fanout of U4F). The signal also triggers U7B, which drives the CLEAR line low for approximately 27 milliseconds via open-collector gate U6B. The CLEAR line clears the digital display via Buffer A11, and resets both the single/double ST counter and the error function circuits on Error Detector A7.

4.69 A remote, manual SF seizure (options 4 and 5), or off-hook (Model 2762 only) generated clear will trigger U2A on the Register, effecting code lamp clearing. The one-shot duration at the output of U2A is approximately three microseconds, in order to be finished before the end of the data present pulse of TP4. This prevents the KP lamp from being erased after the lamp strobe pulse from U3 has occurred. If the source of a reset were a KP1 or KP2/ST2P pulse, then that signal would also erase its own lamp if the one-shot of U2A were too long.

4.70 U5 inhibits the digital display under t wo circumstances: presence of a code or; presence of an ST latch signal from Error Detector A7 via U4D. The only condition under which U6C will gate a data present pulse is if the output of U5 is high. The only conditions under which the output of U5 is high are: no code present; no ST latch signal present; and the presence of a $\overline{CLK}$ pulse from the Decoder A8.

4.71 When a digit present pulse is generated by U6C, three events occur: a digit present pulse is routed to the display via U6A and Buffer A11; digital information in BCD format from the Decoder A8 present at the inputs of D flip-flops U8 and U9 is clocked to the Q outputs) and thses outputs are gated to the digital display via U10 and Buffer A11 for 27 milliseconds as determined by one-shot U7A.

4.72 **BUFFER A11.**

4.73 The Buffer performs six main functions:

a. Provides current sinks for seven LEDs on A13, A14, and A15 upon receipt of commands from A3, A8, and A9;

b. Accepts from Register A9 and transmitts to numeric display BCD digital data, digit present, error present, and clear information;

c. Latches any of the five code lamps until reception of a reset command;

d. Provides the error alarm relay and driver;

e. Provides the colon generator for MF errors;

f. Provides 14 of the 29 outputs to Accessory connector J23 on A17.

4.74 RS flip-flops U5C/U5D and U8/U9 are set by simultaneous code signals from Decoder A8 and a lamp strobe signal from Register A9 which gates U6D and U7. Reset of all latches is accomplished by a signal on pin K (LAMP RESET, from A9).

4.75 The colon generator is formed by U2C, U2D, U2E, and U2F. These open-collector devices, upon reception of the proper command from Error Detector A7, force the four BCD lines low. The BCD output to digital display U1 via U6A and U6B, and U4B and U4C, is the equivalent of decimal 10, which the display interprets as a colon (ten dial pulses would result in a binary and decimal zero).

4.76 Digit present and error pulses are passed through NOR gate U5A/U5B to drive the digital display, but are kept separate for routing to Accessory connector J23. U3 and U4E and U4F are high voltage and current-sink, open-collector devices routed to the Accessory connector to protect the digital display and other TTL circuitry from the possibility on non-TTL voltage levels appearing on J23 and causing damage to anything but U3 and U4.

4.77 **INTERCONNECTION A12.**

4.78 A12 provides:

a. Mounting for and approximately 110 interconnections among A1 through A11;

b. Access to the power transformer and power transistors via J18;

c. Fifty-six external connections via J19 to various controls, displays and inputs at the front panel;

d. Terminal lugs for connection and maintenance of all dc supplies and the SF LEDs on A14 (options 4 and 5);

e. A 34 pin connector to attach a flat ribbon cable to accessory A17.

4.79 **CODE, SUPERVISION AND FREQUENCY LAMP BOARDS (A13, A14, AND A15).**

4.80 These three boards consist entirely of light emitting diodes and current limiting resistors for the LEDs. Each LED anode is connected to +5 Vdc and each cathode to a 100-ohm resistor. A7 provides all drivers for A15; A11 provides all drivers for A13 and the E&M LEDs of A14, and for options 4 and 5, A4 drives the four SF lamps of A14.

4.81 The code lamps (A13), SF lamps (if any, A14) and frequency lamps (A15) light for tone or code present. The other supervision lamps of A14 are dark (negative logic) supervision, i.e., lamp on equals idle (on hook) circuit or line not reversed.

4.82 **ACCESSORY A17.**

4.83 The Accessory board provides twenty-nine connections to the Accessory connector J23 via J21 and J22 flat ribbon cable connectors to A12. These output leads provide TTL data concerning MF and SF (options 4 and 5) frequencies, MF codes, supervision, digital data, error and digital present pulses and an input/output clear line.

WARNING

Do not remove the termination board from the numeric display without first mounting the metal shorting clip over the fingers of the lower display board. The remaining four leads are −12 Vdc, +5 Vdc, +250 Vdc, and ground connections. The three voltage leads are provided with additional filtering on the Termination Board to protect the numeric display.

MAINTENANCE AND CALIBRATION

5.1 INTRODUCTION.

5.2 The six options of the Model 2761 do not require preventative maintenance. This section, therefore, provides only the information and instructions necessary to perform corrective maintenance, including: a performance check; troubleshooting; and calibration. All paragraphs in this section apply equally to all six options of the Model 2761 unless otherwise indicated. Sections 3 and 4 of this manual provide the theory of operation and circuit theory to supplement this section in troubleshooting and maintenance.

NOTE

It is advisable to contact the customer service department at the factory for technical assistance prior to calibration.

5.3 SERVICE INFORMATION.

5.4 Each instrument manufactured by Northeast Electronics is warranted for a period of one year upon delivery to the original purchaser. Complete warranty information is located on the rear of the title page of this manual. Note that written authorization is required prior to the return of any equipment for factory repairs. Additional service information can be obtained by contacting Northeast Electronics, Customer Service Department. P.O. Box 649, Concord, New Hampshire, 03301 telephone number 603-224-6521.

5.5 TEST EQUIPMENT.

5.6 Equipment recommended for testing, troubleshooting, and calibration of the Model 2761, together with the minimum specifications required for each, is listed in Table 5—1. If the recommended equipment is not available, other equipment that meets the minimum specifications can be used.

5.7 MAINTENANCE.

5.8 ACCESS/DISASSEMBLY.

5.9 To obtain access to all circuit boards in the Model 2761, proceed as follows:

PORTABLE UNITS

a. Loosen the four screws on the front panel.

b. Remove the two retaining screws on the bottom of the case.

c. Lift unit out of case.

d. Remove the two screws on the card retainer bracket.

RACK UNITS

a. Remove the two screws on the bottom of the rear of the unit.

b. Slide unit out through front of dust cover.

CAUTION

Do not remove A16 termination board from numeric display without first mounting shorting clip over fingers of lower display board.

5.10 PERFORMANCE CHECK.

NOTE

The following operations are simple, active signal response tests and do not include verification of the effective range of the MIN PULSE WIDTH, MIN REC LEVEL and volume controls. Also the AUDIO ACC. and EXT EQUIP RESET jacks are not checked.

5.11 Remove the power cord from the cover compartment and connect it to the 115 Vac power plug. Insert the other end into a 115 Vac, ± 10 Vac, 50 Hz to 60 Hz source (or into a 230 Vac ±20 Vac 50 Hz to 60 Hz source).

5.12 Without additional connections to the unit, perform the following:

Table 5—1. Test and Calibration Equipment

Equipment Nomenclature	Required Specifications	Recommended Equipment
MF Sender	Fxd Freq: 700,900,1100,1300,1500,1700 Hz Freq. Tol: ± 1% Output Level: +1 dBm min. Output Impedance: 600 ohms	Northeast Electronics TTS 59B MF Sender
Frequency Counter	Accuracy: ± 1 count including time base accuracy Min. Freq. Range: 600 Hz to 2700 Hz Input Impedance: 100K	Northeast Electronics TTS 80C Frequency Counter
Attenuator	Min. Range: 40 dB Impedance: 600 ohms	Daven (circuit T) type VT 795 G
AC Voltmeter	Min. Range: −40 dB to +10 dB Input Impedance: 10M ohms	HP −400FL AC Voltmeter
Oscillator	Frequency: 600 Hz to 2700 Hz min. Max. Output Level: +10 dBm min. Output Impedance: 600 ohms	HP 209A Oscillator
VOM	Max. Range dc volts: 300 volts min. Accuracy: 1.5% of full scale Input Impedance: 20 k ohms/volt	Triplet Model 630NA
Oscilloscope	Dual Channel. Vertical Sensitivity: 0.1 v/cm min. Sweep Speed: 10 ms/cm min. Probe: X1	Tektronix 504

ACTION	RESULT
a. Set AC POWER switch S4 to ON position.	Frequency indicators may be lit. All SUPERVISION lamps light. MF·code lamps may be lit; Numeric display may show random digits. SF (VF) lamps light (options 4 and 5).
b. Momentarily depress AUTO/REM/MAN RESET switch S2 to MAN position.	All frequency and code lamps extinguish. Any digits displayed on numeric display are extinguished. Supervision lamps remain lit.

5.13 Set the front panel controls of the Model 2761 as follows:

a. AC POWER switch S4 to ON.

b. RESET switch S2 to AUTO position.

c. ERROR FUNCTION switch to OFF position.

d. VOLUME controls R1,R2 to midway.

e. MAN/AGC switch S3 to AGC position.

f. MIN PULSE WIDTH control R4 to 18 ms.

g. MIN REC LEVEL control R3 to −23 dB.

h. DISPLAY FUNCTION switch S1 to L1.

i. CAMA FUNCTION switch to OFF position.

5.14 Proceed with the performance test by performing the actions and observing the results as described below:

ACTION	RESULT
a. Patch from the MF sender to the Model 2761 (L1 jacks, J4 or J5 or J2 and J3). Momentarily press RESET switch to MAN position; then return to AUTO position.	
b. Send KP, 0 through 9, ST, 1,2,3,MF signals from MF sender.	Speaker reproduces tones. Frequency lamps light for duration of input. Code lamps KP1 and ST light. Numeric display indicates 0 through 9 only. Supervision lamps idle (lit), indicates idle condition.
c. Place DISPLAY FUNCTION switch in L2 position. Patch from MF sender to L2 jacks (J6 or J7). Send KP, 0 through 9, 0 through 9 again, CD11 (ST3P), 0,1,2,3,CD12 (STP),4,5,6,ST signals from MF sender.	ST lamp and numeric display extinguish after KP code. Numeric display indicates digits as received: 0 through 9 and 0 through 7. Last two digits 8 and 9 replace 0 and 1 on display. (Options 4 and 5 only: last 7 digits replace 2 through 8).
d. Place DISPLAY FUNCTION switch in MF BOTH position. Place CAMA FUNCTION switch in ON position. Send KP1, 0 through 9, CD11 (ST3P), 0 through 9, CD12 (STP), 0 through 3, ST, 4,5,6.	Code lamps and numeric display extinguish after KP code. Numeric display indicates digits as received: 0 through 9 and 0 through 7. Last two digits 8 and 9 replace 0 and 1. Last three digits 4,5,6 do not appear. Last seven digits (0 through 6) do not appear.

5.15 TROUBLESHOOTING.

5.16 To facilitate troubleshooting, a Troubleshooting Guide, Table 5−2, is provided to allow the technician to isolate operational problems to individual printed circuit boards.

5.17 When using the Troubleshooting Guide, make the circuit checks (Possible Cause & Location) in the order listed, a before b, etc. .It is advisable to perform the Performance Test prior to troubleshooting in order to validate any complaints.

5.18 The block diagrams and circuit descriptions located in Section 4, along with the schematic diagrams located in Section 7, serve as valuable supplements in troubleshooting to help the technician pinpoint the problem.

WARNING

Lethal voltages are present in the power supply during operation, and for several minutes after turnoff.

5.19 CALIBRATION.

5.20 The following procedures allow calibration of individual boards after repair or for complete calibration of the Model 2761.

NOTE

Prior to calibration it is advisable that the factory be contacted for technical assistance.

Table 5—2. Model 2761, Troubleshooting Guide.

SYMPTOM	POSSIBLE CAUSE & LOCATION
1. Numeric display (U1) fails to light or digits are half lit. Digits are incorrectly placed. Digits skip spaces or replace previously displayed digits. Digits stack up at one end of the numeric display.	a. Check power supply voltages. b. An orange glow should be visible from rear of display. c. These symptoms indicate a faulty display. Consult factory before removing display.
2. One or more frequency lamps fail to light.	a. Check position of MAN/AGC switch S3 (should be in AGC). b. Speaker should reproduce MF tones thereby indicating a proper connection to the unit. c. Set MAN/AGC switch to MAN position and turn MIN REC LEVEL control fully cw. If lamps still fail to light, return MAN/AGC switch to AGC position. d. Check lamps by grounding pins A through F on A15. e. Check lamp drivers located on A7. f. Check selective detectors (A5,6) for proper outputs.
3. One or more code lamps fail to light.	a. While sending codes, check to see that proper frequency lamps light. b. Check lamps by grounding pins A through F on A13. c. Check for proper setting of the MIN PULSE WIDTH control (fully cw). d. Check lamp drivers located on A11. e. Check MF decoder A8 for proper decoding of MF frequencies.
4. E or M supervision lamps fail to light and/or operate properly.	a. If lamps fail to light, (normal condition is on) check lamps by grounding pins C and B on A14. b. Check lamp drivers located on A11. c. Check E and M level detectors on A3.

Table 5—2. (cont'd).

SYMPTOM	POSSIBLE CAUSE & LOCATION
5. Numeric display fails to reset.	a. Check position of RESET switch. b. Check reset circuitry on A9.
6. Ext Equip relay fails to operate.	a. Check relay K1 on A3.
7. Speaker is dead/noisy or has low volume.	a. Check volume controls for full cw setting. b. Check audio circuits on A3.
8. ACC AUDIO output low or non-existant.	a. Check volume controls for full cw setting. b. Check audio circuits located on A3.
9. Unit fails to display MF digits when in AGC mode of operation.	a. Check AGC circuitry on A2. b. Check Q1 on A3.
10. Unit fails to operate when in MAN mode of operation.	a. Check setting of MIN REC LEVEL control. b. Check MIN REC LEVEL control circuitry on A3.

CAUTION

Refer to Installation Diagram, Figure 3—1, for proper orientation of cards prior to insertion into respective slots.

5.21 Connect the Model 2762 to a proper power source, 115 Vac ±10 Vac, 50 Hz to 60 Hz; or 230 Vac, ±20 Vac, 50/60 Hz.

5.22 **POWER SUPPLY (A1).**

5.23 To calibrate the power supply, proceed as follows:

a. With AC POWER switch off, remove card 1.

b. Plug A1 into extender and insert into card slot 1.

c. Push AC POWER switch on.

d. Using a VOM, measure voltage with respect to ground on pin 21, on card 1. Should be +12 Vdc ± 0.1 Vdc. If out of tolerance, adjust R16.

NOTE

Adjustment of R16 will affect all power supply output voltages. Do not use this adjustment to correct other power supply output voltages.

e. Check dc voltages on pins 20, 22, and 4 against the tolerances listed in Table 5—3.

f. If the +250 Vdc output is out of tolerance, adjust R7.

g. Push AC POWER switch off.

h. Remove extender and install A1 in its slot.

Table 5—3. Power Supply Specifications.

5.24 **MAIN INPUT, (A3).**

TEST POINT*	DC VOLTAGE	RIPPLE (MAX.)
Pin 21	+12 V ± 0.1 V	15 mVac
Pin 20	−12 V ± 0.3 V	15 mVac
Pin 22	+5 V ± 0.2 V	25 mVac
Pin 4	+250 V ± 2.0 V	1.5 Vac
*** All voltage readings taken with respect to ground (pin 1).**		

5.25 To calibrate the main input card, proceed as follows:

a. With AC POWER switch off, remove A3.

b. Plug A3 into extender and insert into card 3 slot.

c. Set following front panel controls on Model 2761 to positions indicated:

1. DISPLAY FUNCTION switch to MF BOTH.

2. MAN/AGC switch to AGC.

3. AC POWER on.

d. Patch from TTS 59B MF Sender to attenuator input.

e. Patch from attenuator output to one of L1 jacks located on Model 2761 front panel.

f. Using MF sender, send a continuous MF signal of digit 6 at a level of +1.0 dBm ± 0.1 dBm.

g. Connect HP 400FL AC Voltmeter to junction of RV1 and R38 (referenced to ground) on A3.

h. Adjust attenuator until a level of −15 dBm ± 0.1 dBm is observed on ac voltmeter.

i. Disconnect ac voltmeter from junction of RV1 and R38 and connect it to Test Point 1.

j. Without changing input level, measure and record level observed on ac voltmeter.

k. Remove patch cord from L1 input jack and insert into one of the L2 input jacks. Do not readjust input level.

l. Disconnect ac voltmeter from TP1 and connect to TP2 on card 3.

m. Observe signal level monitored by the ac voltmeter and, if necessary, adjust potentiometer R49 to obtain a level equal to the recorded level monitored at TP1.

n. Disconnect ac voltmeter from TP2 and connect to TP3.

o. Level monitored at TP3 should be −15 dBm ± 0.1 dBm. If necessary, adjust potentiometer R51 to obtain this reading.

p. Disconnect ac voltmeter from A3 and connect it to attenuator output.

q. Set attenuator to obtain a −23 dBm, ± 0.1 dBm indication on ac voltmeter.

r. Set Model 2761 MIN REC LEVEL control to −23 dBm position.

s. Set MAN/AGC switch to MAN position.

t. Adjust potentiometer R7 on A3 until 1100 and 1300 lamps on Model 2761 front panel are just lit (not flickering).

u. Push Model 2761 AC POWER switch off.

v. Disconnect all test equipment from Model 2761; remove extender and install A3 in slot 3.

5.26 **MF INPUT, (A2).**

5.27 To calibrate the MF Input card, proceed as follows:

a. With AC POWER switch off, remove A2 from Model 2761.

b. Plug A2 into extender and insert into card 2 slot.

c. Perform steps described in paragraphs 5.25 c,d, and e.

d. Using MF sender, send a continuous MF signal of digit 6 at a level of −6 dBm ± 0.1 dBm.

e. Using ac voltmeter, monitor test point two (TP2) on A2, with reference to ground. Meter should indicate −27 dB ± 0.2 dB; if not, adjust potentiometer R20 for correct indication.

f. Disconnect ac voltmeter from Model 2761 and connect it to output connectors of attenuator.

g. Set attenuator to obtain a −25 dBm ± 0.1 dBm indication on ac voltmeter.

h. Adjust potentiometer R33 clockwise until 1100 and 1300 lamps on Model 2761 are extinguished.

i. Slowly adjust R33 counterclockwise until same frequency lamps are just lit (not flickering).

j. Push Model 2761 AC POWER switch off.

k. Disconnect all test equipment from Model 2761; remove extender card and install A2 into slot 2.

5.28 **MF INPUT, OPTIONS 4 AND 5 (A2).**

5.29 To calibrate the dual AGC of Options 4 and 5, proceed as follows:

a. Perform steps described in paragraphs 5.27a to 5.27f, except −27 dBm level should be observed at test point three (TP3).

b. Repeat steps described in paragraphs 5.27a to 5.27f, except apply MF signal to L2 jacks and monitor test point six (TP6) on A2 for −27 dBm; adjust R60 as required.

c. Apply 2600 Hz signal at −25 dBm to L2 jacks; monitor attenuator output with ac voltmeter.

d. Adjust R75 until the level at test point five (TP5) on A2 switches from −12V to +12V.

e. Apply 2600 Hz signal at −25 dBm to L1 jacks. Adjust R34 until the level at test point two (TP2) switches from −12 V to +12 V.

5.30 **MAIN INPUT CARD, OPTIONS 4 AND 5 (A3).**

a. Place A3 on extender card and insert into card 3 slot.

b. Apply MF digit one to L1 at −6 ± 0.1 dBm.

c. Monitor test point three (TP3) on A3 with ac voltmeter. Adjust R51 for a level of −27 ± 0.1 dBm.

d. Apply MF digit one to L2 at −6 ± 0.1 dBm.

e. Adjust R49 for −27 ± 0.1 dBm level at TP3.

f. Repeat steps described in paragraphs 5.25p, through 5.25v.

5.31 **SF (VF) AND MF DETECTORS (A4,A5,A6).**

5.32 The following calibration procedure is for tuning filter F1 on A5 to a center frequency of 700 Hz. The format is the same for filters F2 and F3; for F1,F2, and F3 on A6; and (options 4 and 5) for F1,F2, F3 and F4 on A4.

5.33 Refer to Figures 5−1 and 5−2 for calibration controls and their locations and to Table 5−4 for filter identification and associated frequencies.

5.34 Prior to calibration of the MF filter card, isolate F1 (A5, 700 Hz) as follows:

NOTE

Use proper soldering techniques in performing the following steps.

a. With AC POWER switch off, remove A5 from Model 2761.

b. Unsolder the end of resistor R1 common with capacitor C1.

c. Unsolder the end of resistor R8 common with pin 5 on printed circuit board.

5.35 To isolate input filter F2, perform the following steps:

a. Unsolder the end of resistor R24 common with capacitor C9.

b. Unsolder the end of resistor R31 common with pin 16 of printed circuit board.

5.36 To isolate input of filter F3, perform the following steps:

a. Unsolder the end of resistor R47 common with capacitor C17.

b. Unsolder the end of resistor R54 common with pin 11 of the printed circuit board.

5.37 To isolate F1,F2,F3, or F4 of A4 only (options 4 and 5).

a. Unsolder the end of resistor R1,R45,R23, or R67 common with capacitor C1,C17,C9, or C25 respectively.

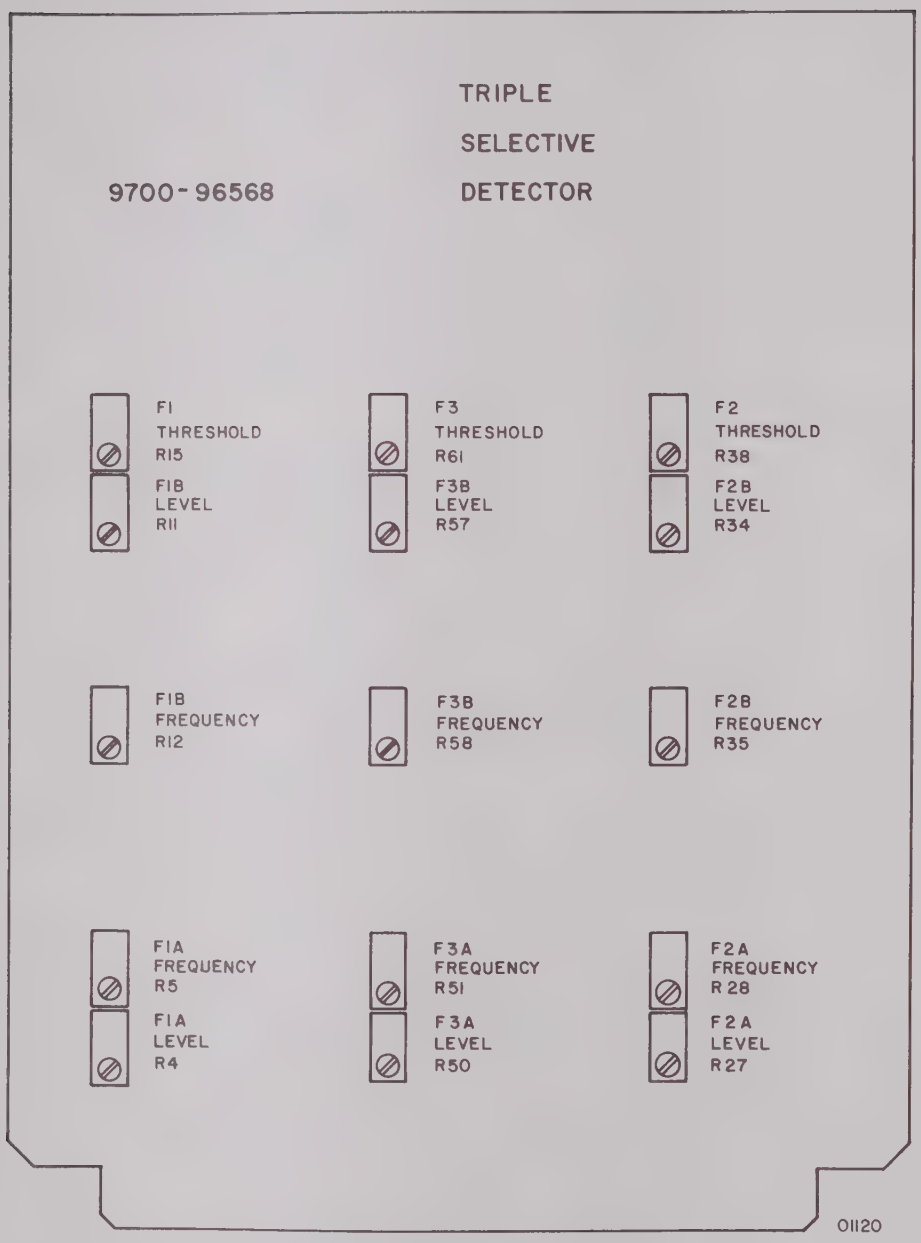


Figure 5—1. Model 2761 Triple Selective Detector Calibration Control Function and Location.

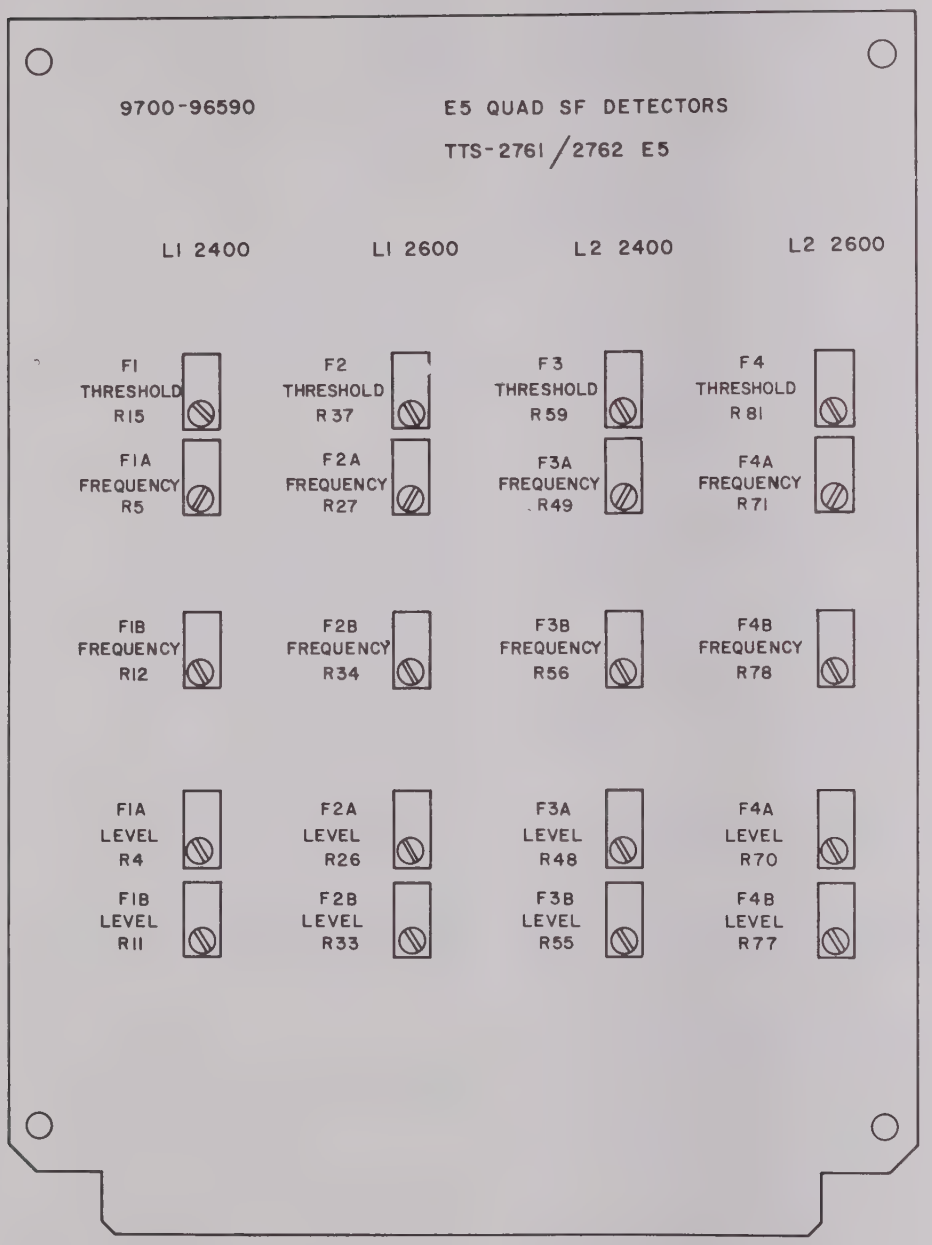


Figure 5—2. Model 2761 Quad SF (VF) Detector Calibration Control Function and Location.

b. Unsolder the end of resistor R8,R52,R30, or R74 common with pin 5,16,11, or 15 respectively on printed circuit board.

5.38 Prior to pushing the AC POWER switch of the Model 2761 ON, plug A5 into the extender and install in slot 5. Remove A3.

5.39 Initial set up of the test equipment is as follows:

a. Patch from HP209A oscillator output jacks to input of attenuator and TTS 80C frequency counter (TTS 80C IMPEDANCE switch in BRIDGE position).

b. Connect attenuator output to the unsoldered end of resistor R1 and ground (pin 2B).

c. Connect output of oscillator to input of ac voltmeter.

d. Set output frequency of oscillator to 700 Hz and output level for a −25 dB ± 0.1 dB reading on ac voltmeter.

e. Disconnect ac voltmeter from oscillator and connect to output terminals of attenuator.

f. Set attenuator for a −30 dBm ± 0.1 dBm reading on ac voltmeter.

g. Disconnect ac voltmeter from attenuator, and connect it to junction of potentiometer R4 and resistor R6, with reference to ground (pin B).

h. Connect a lead from chassis ground, on the Model 2761, to chassis ground of Tektronix 504 oscilloscope.

i. Connect input of oscilloscope to pin 6F on A5.

5.40 Set the oscilloscope controls as follows:

a. Sweep Time/cm to 5.0 ms/cm.

b. Input to AC.

c. Vertical Sensitivity to 5 V/cm.

d. Triggering:

1. Trigger Level to Auto.

2. Source to Internal.

3. Coupling to AC.

4. Slope to plus.

5.41 Adjust the attenuator output level for a −30 dBm ± 0.2 dBm reading on the ac voltmeter.

5.42 With the intensity, focus, and position controls on the oscilloscope set to provide a good midscreen display of the signal, one of two conditions of the waveform should appear:

a. An apparent straight line, or

b. Oscillations (distorted waveforms).

5.43 If the sweep is an apparent straight line, adjust potentiometer R4 (F1A) in a counterclockwise direction (Figure 5−1), until the filter goes into oscillation and then in a clockwise direction until the oscillations disappear.

5.44 If oscillations are already present, adjust potentiometer R4 in a clockwise direction until the oscillations disappear.

5.45 Adjust the oscillator frequency until a peak level is observed on the ac voltmeter. This indicates the peak frequency of the filter. Adjust R7 until the ac voltmeter indicates −10 dBm ± 0.1 dBm.

5.46 Observe the frequency counter. It should indicate 675 Hz, ± 2.0 Hz at the peak frequency of the first filter section (F1A). If the frequency is too low, adjust R5 in a clockwise direction until the proper peak frequency is obtained. The peak frequency is found by adjusting the oscillator frequency after each adjustment of R5 until the peak level indication is coincident with the desired peak frequency. Then adjust potentiometer R4 for a −10 dBm level indication on the ac voltmeter.

5.47 To calibrate the second filter section (F1B) for peak frequency, connect the test equipment in the following manner:

a. Disconnect attenuator from R1 and connect to the unsoldered end of R8.

b. Disconnect ac voltmeter from junction of potentiometer R11 and R13.

5.48 To calibrate the second filter section (F1B), follow the same procedure outlined in paragraphs 5.42 through 5.46 for the first filter section F1A, except for the following deviations:

a. Peak frequency is 725 Hz ± 2.0 Hz.

Table 5—4. Filter Frequency Chart For SF (VF) And MF Detectors (A4,A5,A6).

CARD	FILTER	CENTER FREQUENCY (HZ)	FILTER SECTION	PEAK FREQUENCY HZ
A4	F1	2400	F1A	2395
			F1B	2405
	F2	2400	F2A	2395
			F2B	2405
	F3	2600	F3A	2595
			F3B	2605
	F4	2600	F4A	2595
			F4B	2605
A5	F1	700	F1A	675
			F1B	725
	F2	900	F2A	875
			F2B	925
	F3	1100	F3A	1075
			F3B	1125
A6	F1	1300	F1A	1275
			F1B	1325
	F2	1500	F2A	1475
			F2B	1525
	F3	1700	F3A	1675
			F3B	1725

b. Adjust potentiometer R11 instead of R4 for level, and potentiometer R12 instead of R5 for peak frequency.

NOTE

The deviations reflect the information found on Table 5—4 and Figure 5—1.

5.49 After two filer sections are calibrated, disconnect the attenuator from R8 and connect to pin 7H of A5.

5.50 Push the Model 2761 AC POWER switch off.

5.51 Solder resistors R1 and R8 back onto the printed circuit board.

5.52 Push the Model 2761 AC POWER switch on.

5.53 Set the output frequency of the oscillator to 100 Hz ± 1.0 Hz below the desired center frequency, in this case 600 Hz, since the center frequency is 700 Hz as indicated on Table 5—4.

5.54 While observing the ac voltmeter and frequency meter, slowly adjust the oscillator frequency toward 800 Hz (100 Hz above center frequency) and note the meter readings. The first peak should represent approximately 675 Hz, the valley approximately 700 Hz, and the second peak approximately 725 Hz. At this time, the peaks may be of any level. See Figure 5—2 for a graphic representation of level and frequency indications.

5.55 After having observed the pattern, tune to the greater peak and observe the indication on the frequency counter. If the frequency is approximately 675 Hz, the peak is F1A. If the peak is approximately 725 Hz, the peak is F1B. This may be determined by referring to Table 5—5 for A5 F1A, F1B.

5.56 Adjust the potentiometer for whichever peak has been tuned, potentiometer R4 for peak F1A; potentiometer R11 for peak F1B. Adjust the potentiometer in a clockwise direction to decrease the level. Do not decrease below the level of center frequency (valley).

5.57 For example: Referring to Figure 5—3, if the highest peak was F1A, its amplitude was +1.8 dBm, and the amplifude of the valley was —1.2 dBm, potentiometer R4 would be turned clockwise until the peak of F1A amplitude was —0.8 dBm, or approximately 0.4 higher than the valley.

5.58 Tune the oscillator to the second peak level (F1B) on the ac voltmeter.

5.59 Adjust potentiometer R11 slightly in the clockwise direction until the level is —0.8 dBm, or 0.4 dB above the center frequency amplitude, the same as F1A.

5.60 Since adjusting the peaks has an effect on the overall response pattern, it may be necessary to continue tuning and adjusting R4 and R11 until a response similar to Figure 5—4 is obtained.

5.61 Tune the oscillator to the valley of the response curve (700 Hz) and observe the oscilloscope to see if the output on pin F is high (approximately +5.0 Vdc).

5.62 Set the oscillator frequency to 100 Hz below center frequency then, while observing the ac voltmeter frequency counter and oscilloscope, slowly sweep the range of frequencies from 100 Hz below to 100 Hz above center frequency. Check for the following:

a. Peaks are within 0.4 dB of the valley in the response.

b. Frequencies should be within 5 Hz low of F1A (675 Hz) before the output at pin F goes high, as shown on the oscilloscope, and within 5 Hz above F1B (725 Hz) before it goes low.

5.63 Disconnect the ac voltmeter from the junction of potentiometer R11 and R15, and connect to the output terminals of the attenuator.

5.64 Set the oscillator frequency to 700 Hz ± 1.0 Hz.

5.65 Set the attenuator for a —37 dBm reading on the ac voltmeter.

5.66 The oscilloscope should indicate one of two conditions, a high (approximately +5.0 Vdc) or a low (approximately 0 Vdc) output appearing on pin F.

5.67 If a high output is monitored, adjust potentiometer R15 (threshold) in a counterclockwise direction until the output goes low; then clockwise until the output just goes high.

5.68 If a low output is monitored, adjust potentiometer R15 clockwise until the output at pin F just goes high.

5.69 **RESPONSE TIME ADJUSTMENT (A5 AND A6 ONLY).**

5.70 Attach channel one scope probe to junction of R1 and C1; attach channel two scope probe to pin 6 of printed circuit board. Set oscilloscope controls as follows:

a. Sweep time/cm to 1 ms/cm.

b. Input of both channels to DC.

c. Vertical sensitivity of channel one to most sensitive (clockwise) position.

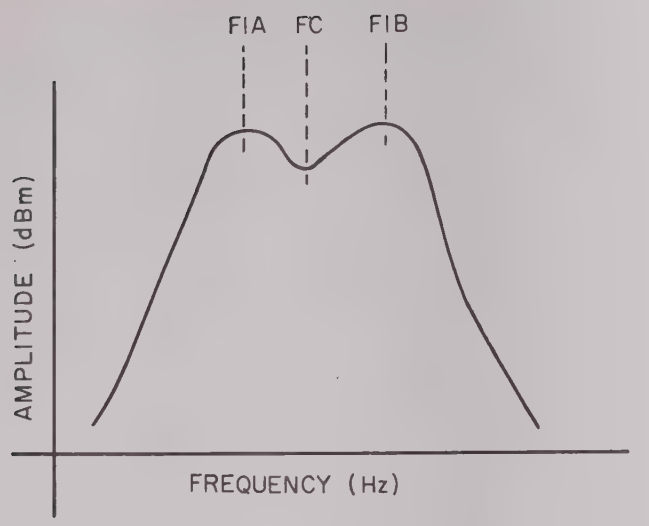
d. Vertical sensitivits of channel two to 1 V/cm.

e. Triggering: channel one, auto, internal, ac coupling, positive slope.

f. Display to chop.

5.71 Observe oscilloscope channel two as 700 Hz ± 2 Hz at —30 dBm is intermittently applied to pin 7 on the printed circuit board. A positive going pulse should occur within 7.5 ± 0.5 milliseconds after each presentation of input (channel one). Adjust R15 clockwise to decrease delay as required.

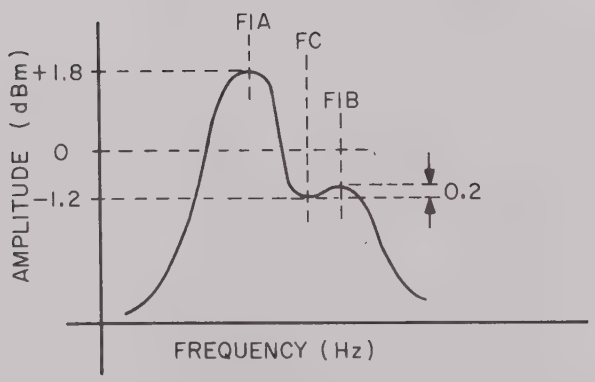
5.72 Push AC POWER switch off. Remove extender card and replace A3 and A5.



FIA = 675 Hz
FC = 700 Hz
FIB = 725 Hz

00603

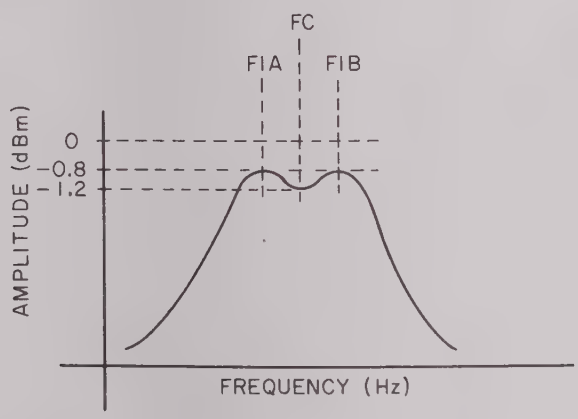
Figure 5—3. Model 2761 700 Hz Selective Detector Response After Filter Frequency Calibration.



FIA = 675 Hz
FC = 700 Hz
FIB = 725 Hz

00602

Figure 5—4. Model 2761 700 Hz Selective Detector Response After F1A Level Adjustment.



FIA = 675 Hz
FC = 700 Hz
FIB = 725 Hz

00604

Figure 5—5. Model 2761 700 Hz Selective Detector Response After F1A and F1B Calibration.

SECTION 6

ELECTRONIC PARTS LIST

6.1 INTRODUCTION.

6.2 This section provides the parts lists and associated component location diagrams for location and identification of parts. Tables 6—1 through 6—26 are the parts lists and Figures 6—1 through 6—19 are the component location diagrams.

Table 6—1. Model 2761, Overall Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
A1	PS BD ASSY 95875						A27611CC1C
A2	MF INPUT A6D ASSY 95883						A276110011
A3	ASSY A3 MAIN INPUT						A276202012
A5	ASSY A5 MF DET 7/9/11						A276202013
A6	ASSY A6 MF DET 13/15/17						A276202014
A7	ASSY A7 MF ERROR DET						A276202015
A8	DECODER ASSY 95874						A276110016
A9	ASSY A9 REGISTER						A276202016
A11	ASSY A11 BUFFER						A276202017
A12	ASSY A12 INTERCONN						A276202018
A13	MP LAMP BD 95935						A276111C1C
A14	ASSY A14 SUPERVISION						A276202019
A15	FREQ LAMP BD 95937						A276111012
A16	TERM BD ASSY 95932						A276111013
A17	ASSY A17 ACCESSORY						A276102012
F1	FUSE SLO-BLO				BUSSMAN	MDL	863101400
F2	FUSE, SLO-BLO				BUSSMAN	MDL	863101700
J1	BINDING POST METAL GND				H H SMITH	137SP	6525001C0
J2	BINDING POST-RED				GRAYHILL	29-1R	652400400
J3	BINDING POST-BLK				GRAYHILL	29-1B	6524003C0
J4-13	HI-D				SWCRFT	M-112B	650101300
J14	BINDING POST-RED				GRAYHILL	29-1R	652400400
J15	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J16	3-PIN	6A		250V	BELDEN	17252	652201700
LS1	SPEAKER 45 OHM				QUAM	25A07-Z45	9260002C0
R1	1K-1K	1/2W			CLARCSTAT	CM41156	238001023
R2	1K-1K	1/2W			CLARCSTAT	CM41156	238001023
R3	5K	2W	10%		CH MITE	CU-5021	232005020
R4	150K	2W	10%		AB	CU-1541	232001540
R8-13	1K	1/4W	10%		AB	TYPE CB	200101026
S1	STRAPPING S-1						A276102C15
S2	DPDT	5A		28V	C+K COMP	7213P3DZB	620401100
S3	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S4	DPDT 5A IN RUSH			250V	ALCO	MTF-206N	620700001
S5	DPDT LOCKING				SWCRFT	46206LF	6455002C0
S6	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S7	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
TP1	TIEPOINT,DOUBLE				IEH	TS-607	836400200
TP2	TIEPOINT,FOUR TERM				IEH	STS0531-4	836400600
U1	16POS				BURROUGHS	SSD-10000041	720100800
W1	W1 CABLE ASSY & INSTALL						A276202023

Table 6—2. Model 2761R, Overall Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
A1	PS BD ASSY 95875						A276110010
A2	MF INPUT A60 ASSY 95883						A276110011
A3	ASSY A3 MAIN INPUT						A276202012
A5	ASSY A5 MF DET 7/9/11						A276202013
A6	ASSY A6 MF DET 13/15/17						A276202014
A7	ASSY A7 MF ERROR DET						A276202015
A8	DECODER ASSY 95874						A276110016
A9	ASSY A9 REGISTER						A276202016
A11	ASSY A11 BUFFER						A276202017
A12	ASSY A12 INTERCONN						A276202018
A13	KP LAMP BD 95935						A276111010
A14	ASSY A14 SUPERVISION						A276202019
A15	FREQ LAMP BD 95937						A276111012
A16	TERM BD ASSY 95932						A276111013
A17	ASSY A17 ACCESSORY						A276102012
F1	FUSE SLO-BLO				BUSSMAN	MDL	863101400
F2	FUSE, SLO-BLO				BUSSMAN	MDL	863101700
J1	BINDING POST METAL GND				H H SMITH	137SP	652500100
J2	BINDING POST-RED				GRAYHILL	29-1R	652400400
J3	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J4-13	HI-D				SWCRFT	M-112B	650101300
J14	BINDING POST-RED				GRAYHILL	29-1R	6524004CC
J15	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J16	3-PIN	6A		250V	BELDEN	17252	652201700
J24	18 CONTACT				CINCH	18-140Y	850023C0
LS1	SPEAKER 45 OHM				QUAM	25A07-Z45	926000200
R1	1K-1K	1/2W			CLARCSTAT	CM41156	238001023
R2	1K-1K	1/2W			CLARCSTAT	CM41156	238001023
R3	5K	2W	10%		OH MITE	CU-5021	232005020
R4	150K	2W	10%		AB	CU-1541	232001540
R8-13	1K	1/4W	10%		AB	TYPE CB	200101026
S1	STRAPPING S-1						A276102015
S2	DPDT	5A		28V	C+K COMP	7213P3DZB	620401100
S3	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S4	DPDT 5A IN RUSH			250V	ALCC	MTF-206N	620700001
S5	DPDT LOCKING				SWCRFT	46206LF	645500200
S6	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S7	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
TP1	TIEPOINT,DOUBLE				IEH	TS-607	836400200
TP2	TIEPOINT,FOUR TERM				IEH	STS0531-4	836400600
U1	16POS				BURRCUGHS	SSD-10000041	720100800
W1	ASSY P1/P2 CABLE RACKS						A276203014

Table 6—3. Model 2761, Option 4, Overall Parts List.

NORTHEAST ELECTRONICS — REPLACABLE PARTS LIST FOR ASSEMBLY D2761-74-001
2761-E5 C/A ASSY — PAGE 1 REV 02 DATED 5/12/76

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
A1	PS BD ASSY 95875						A276110010
A2	ASSY A2 E5 DUAL AGC						A276274015
A3	ASSY A3 MAIN INPUT						A276202012
A4	ASSY A4 E5 QUAD SF DET						A276274016
A5	ASSY A5 MF DET 7/9/11						A276202013
A6	ASSY A6 MF DET 13/15/17						A276202014
A7	ASSY A7 E5 MF ERROR DET						A276274012
A8	ASSY A8 DECODER CCITTS						A276274017
A9	ASSY A9 REGISTER						A276202016
A11	ASSY A11 BUFFER						A276202017
A12	ASSY A12 INTERCONN						A276202018
A13	KP LAMP BD 95935						A276111010
A14	ASSY A14 E5 SUPERVISION						A276274013
A15	FREQ LAMP BD 95937						A276111012
A16	TERM BD ASSY 95932						A276111013
A17	ASSY A17 ACCESSORY						A276102012
F1	FUSE SLO-BLO				BUSSMAN	MDL	863101400
F2	FUSE, SLO-BLO				BUSSMAN	MDL	863101700
J1	BINDING POST METAL GND				H H SMITH	137SP	652500100
J2	BINDING POST-RED				GRAYHILL	29-1R	652400400
J3	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J4-13	HI-D				SWCRFT	M-112B	650101300
J14	BINDING POST-RED				GRAYHILL	29-1R	652400400
J15	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J16	3-PIN	6A		250V	BELDEN	17252	652201700
LS1	SPEAKER 45 OHM				QUAM	25A07-Z45	926000200
R1	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R2	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R3	5K	2W	10%		OH MITE	CU-5021	232005020
R4	150K	2W	10%		AB	CU-1541	232001540
R8-13	1K	1/4W	10%		AB	TYPE CB	200101026
S1	STRAPPING S-1						A276102015
S2	DPDT	5A		28V	C+K COMP	7213P3DZB	620401100
S3	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S4	DPDT 5A IN RUSH			250V	ALCO	MTF-206N	620700001
S5	DPDT LOCKING				SWCRFT	46206LF	645002200
S7	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
TP1	TIEPOINT,DOUBLE				IEH	TS-607	836400200
TP2	TIEPOINT,FOUR TERM				IEH	STS0531-4	836400600
U1	16POS				BURROUGHS	SSD-10000041	720100800
W1	W1 CABLE ASSY & INSTALL						A276202023

Table 6—4. Model 2761R, Option 5, Overall Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
A1	PS BD ASSY 95875						A276110010
A2	ASSY A2 E5 DUAL AGC						A276274015
A3	ASSY A3 MAIN INPUT						A276202012
A4	ASSY A4 E5 QUAD SF DET						A276274016
A5	ASSY A5 MF DET 7/9/11						A276202013
A6	ASSY A6 MF DET 13/15/17						A276202014
A7	ASSY A7 E5 MF ERROR DET						A276274012
A8	ASSY A8 DECODER CCITTS						A276274017
A9	ASSY A9 REGISTER						A276202016
A11	ASSY A11 BUFFER						A276202017
A12	ASSY A12 INTERCONN						A276202018
A13	KP LAMP BD 95935						A276111010
A14	ASSY A14 E5 SUPERVISION						A276274013
A15	FREQ LAMP BD 95937						A276111012
A16	TERM BD ASSY 95932						A276111013
A17	ASSY A17 ACCESSORY						A276102012
F1	FUSE SLO-BLO				BUSSMAN	MDL	863101400
F2	FUSE, SLO-BLO				BUSSMAN	MDL	863101700
J1	BINDING POST METAL GND				H H SMITH	137SP	652500100
J2	BINDING POST-RED				GRAYHILL	29-1R	652400400
J3	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J4-13	HI-D				SWCRFT	M-112B	650101300
J14	BINDING POST-RED				GRAYHILL	29-1R	652400400
J15	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J16	3-PIN	6A		250V	BELDEN	17252	6522017C0
J24	18 CONTACT				CINCH	18-140Y	850002300
LS1	SPEAKER 45 OHM				QUAM	25A07-Z45	926000200
R1	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R2	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R3	5K	2W	10%		OH MITE	CU-5021	232005020
R4	150K	2W	10%		AB	CU-1541	232001540
R8-13	1K	1/4W	10%		AB	TYPE CB	200101026
S1	STRAPPING S-1						A276102015
S2	DPDT	5A		28V	C+K COMP	7213P3DZB	620401100
S3	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S4	DPDT 5A IN RUSH			250V	ALCO	MTF-206N	620700001
S5	DPDT LOCKING				SWCRFT	46206LF	645500200
S7	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
TP1	TIEPOINT,DOUBLE				IEH	TS-607	836400200
TP2	TIEPOINT,FOUR TERM				IEH	STS0531-4	836400600
U1	16POS				BURROUGHS	SSD-10000041	~~720100800~~
W1	ASSY P1/P2 CABLE RACKS						A276203014

A276202-02-03

Table 6—5. Model 2761, Power Switch Assembly S4 Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1	T 1-3/4	80MA		14V	CHICAGO	CM386	730003700

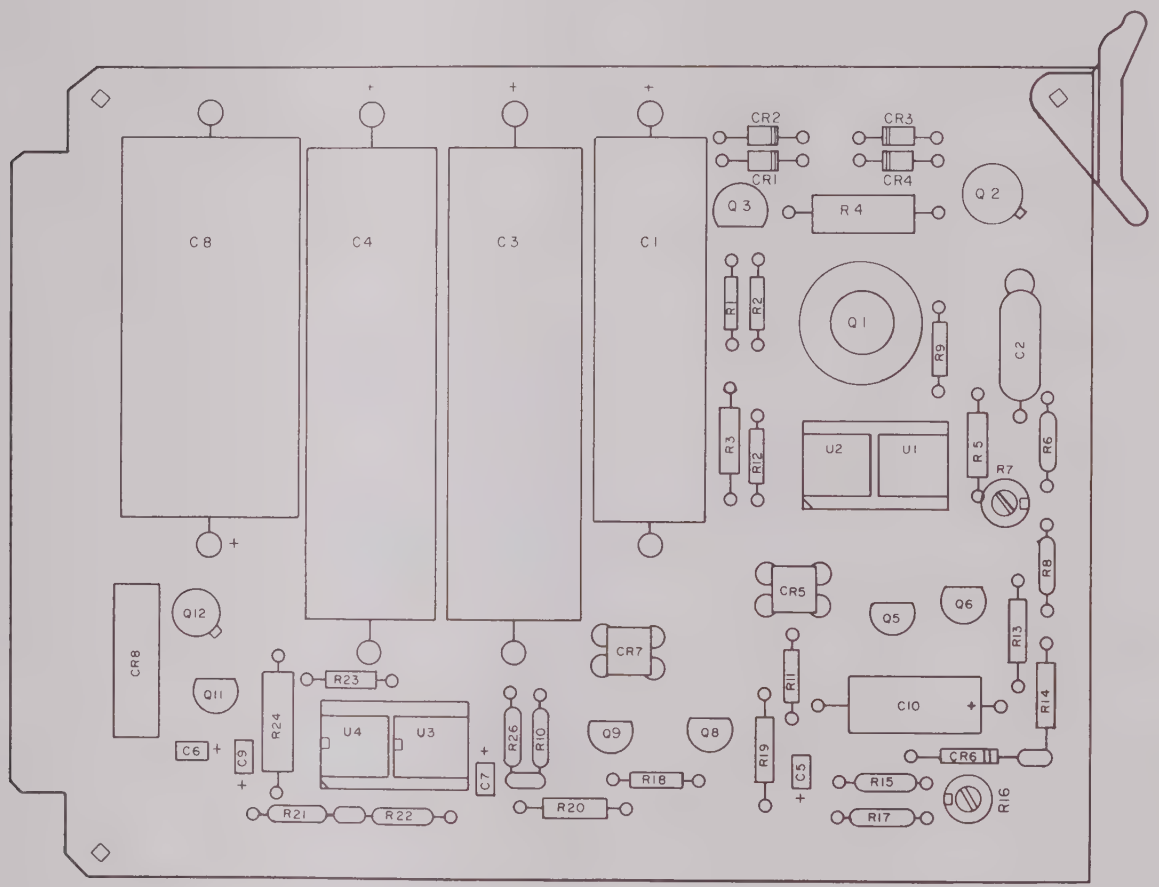


Figure 6—1. Model 2761 Power Supply, A1 (95875), Component Location.

Table 6—6. Model 2761 Power Supply, A1 (95875) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	20UF			350V	SPRAGUE	39D206F350FL4	3CC002060
C2	.022UF		10%	400V	SPRAGUE	4PS-S22	321202230
C3	1100UF			30V	SPRAGUE	39D118G030GP4	3CC001P0
C4	1100UF			30V	SPRAGUE	39D118G030GP4	3CCC01180
C5	4.7UF		10%	25V	KEMET	T330A475K025AS	31C004751
C6	4.7UF		10%	25V	KEMET	T330A475K025AS	31C004751
C7	2.2UF		10%	35V	KEMET	T330A225K035AS	310002250
C8	4CCOUF			15V	SPRAGUE	39D408G015JL4	3CCC04081

Table 6—6. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C9	22UF		10%	6V	KEMET	T330A226K006AS	310002260
C10	100UF			16V	SPRAGUE	TE-1162	300201071
CR1	A38AH			600V	TI	1N2071	560020710
CR2	A38AH			600V	TI	1N2071	560020710
CR3	A38AH			600V	TI	1N2071	560020710
CR4	A38AH			600V	TI	1N2071	560020710
CR5	4 DIODE FULL WAVE				MOTOROLA	MDA920-A2	565009202
CR6	DO-7	250MW	5%	6.2V	DICKSON	1N823	563008230
CR7	4 DIODE FULL WAVE				MOTOROLA	MDA920-A2	565009202
CR8	4 DIODE FULL WAVE				MOTOROLA	MDA960-1	565009601
Q1	I -1A H 30 GB 15MHZ				RCA	2N5416	552054160
Q2	TO5	10W		350V	RCA	2N3439	550034390
Q3	TO92MSS	310MW		40V	MOTOROLA	2N3905	552039050
Q5	TO92HSS	310MW		40V	MOTOROLA	2N3903	550039030
Q6	TO92HSS	310MW		40V	MOTOROLA	2N3903	550039030
Q8	TO92MSS	310MW		40V	MOTOROLA	2N3905	552039050
Q9	TO92MSS	310MW		40V	MOTOROLA	2N3905	552039050
Q11	TO92HSS	310MW		40V	MOTOROLA	2N3903	550039030
Q12	TO5HNS	1W		65V	RCA	2N2102	550021020
R1	10-	1/4W	10%		AB	TYPE CB	200101006
R2	1.8K	1/4W	10%		AB	TYPE CB	200101826
R3	820K	1/2W	10%		AB	TYPE EB	200208246
R4	120K	1W	5%		OHMITE	LITTLE DEVIL	200701245
R5	8.2K	1/2W	10%		AB	TYPE EB	200208226
R6	511K	1/4W	1%		ELECTRA	RN60 SIZE 100 PPM	220551131
R7	2K	1/2W	10%	200V	HELIPOT	62PR2K	232702026
R8	23.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220223721
R9	1M	1/4W	10%		AB	TYPE CB	200101056
R10	7150-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220271511
R11	47K	1/4W	10%		AB	TYPE CB	200104736
R12	2.7K	1/4W	10%		AB	TYPE CB	200102726
R13	1-	1/2W	10%		AB	TYPE EB	200200106
R14	1.2K	1/2W	10%		AB	TYPE EB	200201226
R15	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
R16	1K	1/2W	10%	200V	HELIPOT	62PR1K	232701026
R17	5.62K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220256211
R18	2.7K	1/4W	10%		AB	TYPE CB	200102726
R19	1-	1/2W	10%		AB	TYPE EB	200200106
R20	1.2K	1/2W	10%		AB	TYPE EB	200201226
R21	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R22	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R23	2.7K	1/4W	10%		AB	TYPE CB	200102726
R24	.18-	2W	5%		IRC	BWH	210201885
R25	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
U1	8PDIL	00MW		180	SIGNETICS	UA741CV	500057410
U2	8PDIL	00MW		180	SIGNETICS	UA741CV	500057410
U3	8PDIL	00MW		180	SIGNETICS	UA741CV	500057410
U4	8PDIL	00MW		180	SIGNETICS	UA741CV	500057410
XU1-2	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400

Table 6—7. Model 2761 Transformer Assembly Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
J18	22PIN DUAL EYELET				AMPHENOL	225-22221-101	651701000
Q4	LPA	25w		40V	MOTOROLA	2N4910	550049100
Q7	LPA	25W		40V	MOTOROLA	2N4898	552048980
Q10	TO3LPA	115w		60V	RCA	2N3055	550030550
T1	P115 S 6@9 1@200				PRECISION	NEC4A	420200600

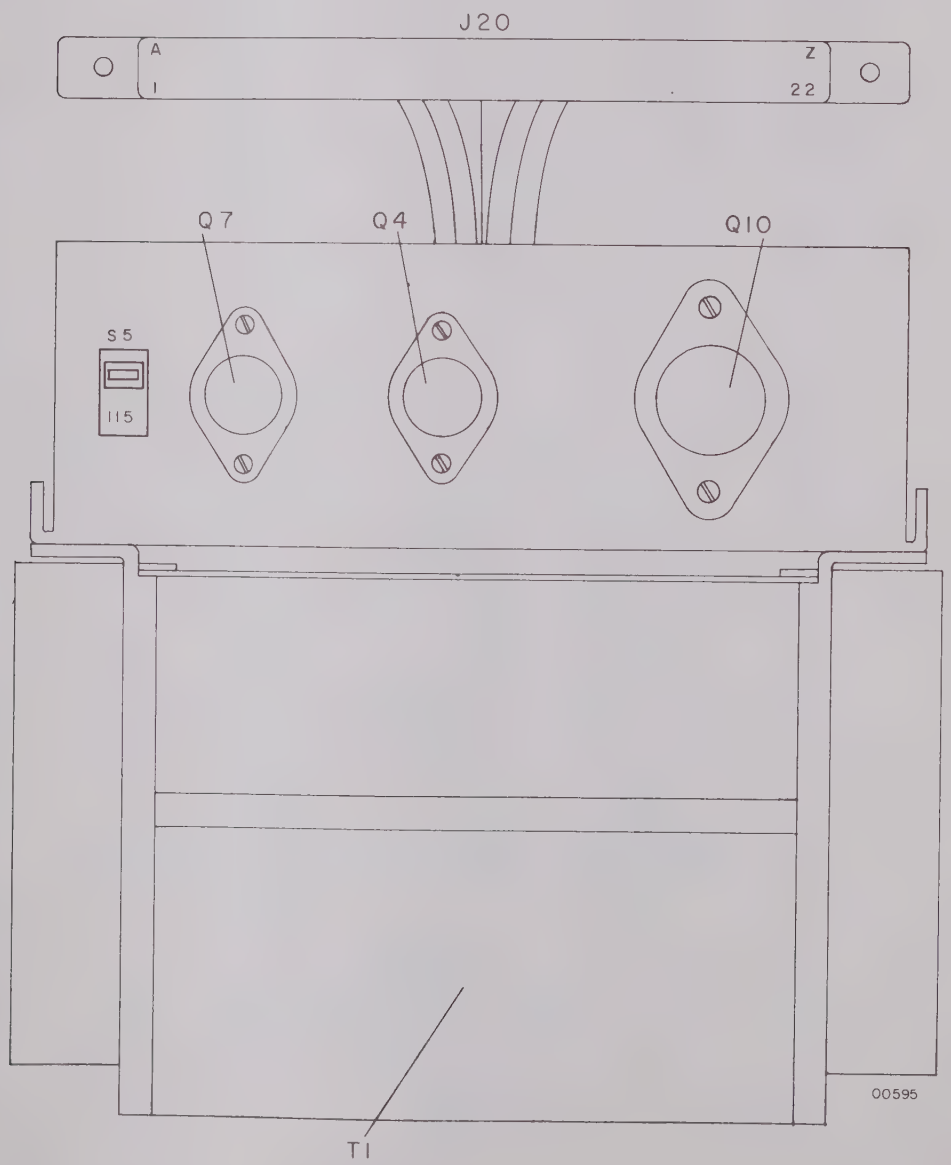


Figure 6—2. Model 2761 Transformer Assembly Component Location.

Table 6—8. Model 2761 MF Input (AGC), A2 (95883) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C2	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C3	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C4	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C5	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C6	15UF		10%	10V	KEMET	T330A156K010AS	310001560
C7	.22UF		10%	50V	KEMET	T330A224K050AS	310002240
C8	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C9	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C10	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C11	22PF	S2LTC	10%	1KV	CENTRALAB	CC-220	330002200
CR1-3	D035	500MW		75V	FAIRCHILD	1N4148	560041480
Q1	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
Q2	TO92 TO 92			400V	MOTOROLA	MPF152 2N5461	555001520
Q3	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
R1	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R2	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R3	22K	1/4W	10%		AB	TYPE CB	200102236
R4	1K	1/4W	10%		AB	TYPE CB	200101026
R5	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R6	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R7	22K	1/4W	10%		AB	TYPE CB	200102236
R8	1K	1/4W	10%		AB	TYPE CB	200101026
R9	3.9K	1/4W	10%		AB	TYPE CB	200103926
R10	1.8K	1/4W	10%		AB	TYPE CB	200101826
R11	100K	1/4W	10%		AB	TYPE CB	200101046
R12	10K	1/4W	10%		AB	TYPE CB	200101036
R13	47K	1/4W	10%		AB	TYPE CB	200104736
R14	47K	1/4W	10%		AB	TYPE CB	200104736
R15	10-	1/4W	10%		AB	TYPE CB	200101006
R16	1.5M	1/4W	10%		AB	TYPE CB	200101556
R17	1.5K	1/4W	10%		AB	TYPE CB	200101526
R18	3.3K	1/4W	10%		AB	TYPE CB	200103326
R19	1.5K	1/4W	10%		AB	TYPE CB	200101526
R20	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R21	6.8K	1/4W	10%		AB	TYPE CB	200106826
R22	2.2K	1/4W	10%		AB	TYPE CB	200102226
R23	120-	1/4W	10%		AB	TYPE CB	200101216
R24	1K	1/4W	10%		AB	TYPE CB	200101026
R25	120-	1/4W	10%		AB	TYPE CB	200101216
R26	2.2K	1/4W	10%		AB	TYPE CB	200102226
R27	2.2K	1/4W	10%		AB	TYPE CB	200102226
R28	3.3K	1/4W	10%		AB	TYPE CB	200103326
R29	1.5K	1/4W	10%		AB	TYPE CB	200101526
R30	1.5K	1/4W	10%		AB	TYPE CB	200101526
R31	27K	1/4W	10%		AB	TYPE CB	200102736
R32	4.7M	1/4W	10%		AB	TYPE CB	200104756
R33	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R34	22K	1/4W	10%		AB	TYPE CB	200102236
R35	3.9M	1/4W	10%		AB	TYPE CB	200103956
R36	100K	1/4W	10%		AB	TYPE CB	200101046

Table 6—8. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R37	470-	1/4W	10%		AB	TYPE CB	2C0104716
SV1	SILICON				SCHAUER	SV-1	56551CCC0
U1	8PDIL	80MW		18C	SIGNETICS	N5558V	5CC055580
U2	8PDIL	80MW		18C	SIGNETICS	N5558V	5CC055580
U3	2PTC5M				RCA	CA3026	5C0030260
XQ1-3	SKT				ELCO	05-3303	8266001C0
XU1	SKT IC 16P PC				AUGAT	316-AG5D-2R	82C1004C0
XU2	SKT IC 12P PC TOS TEFLON				AUGAT	8058-1G55	8202C02C0

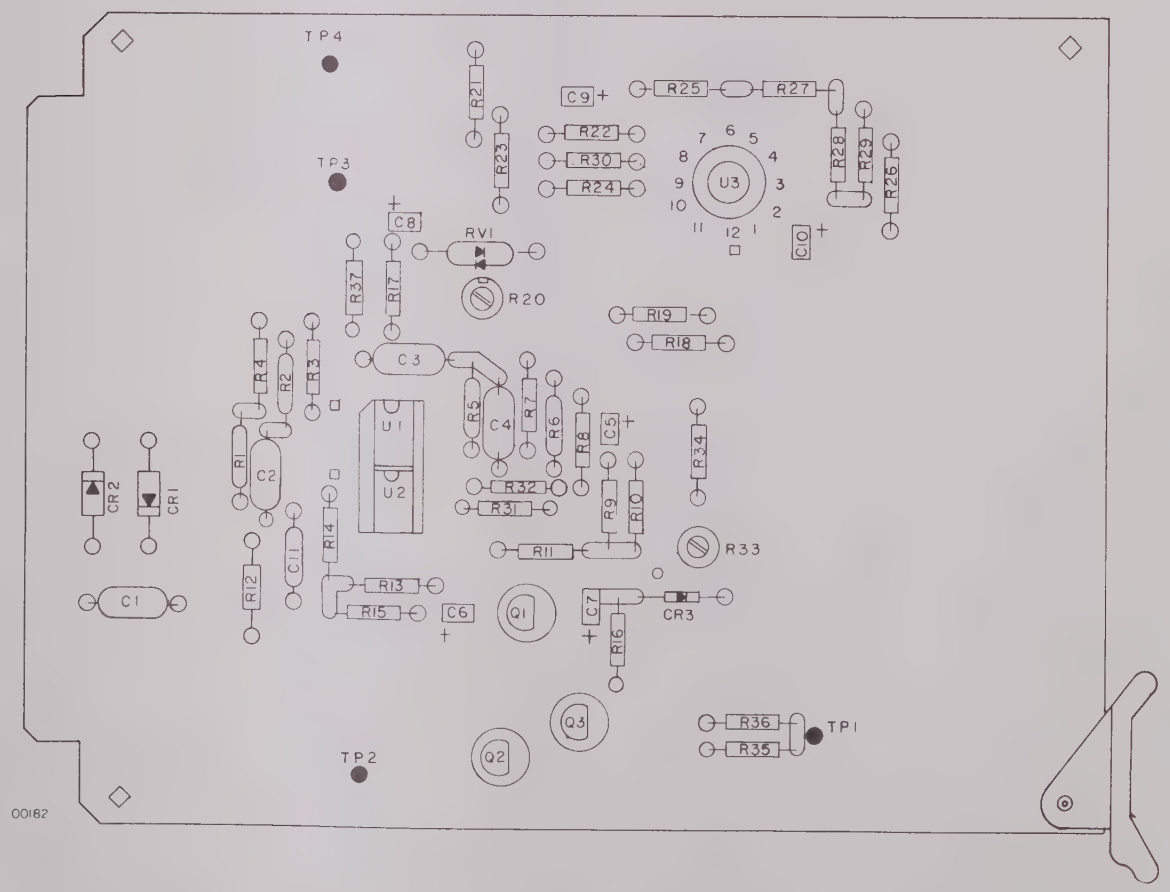


Figure 6—3. Model 2761 MF Input (AGC), A2 (95883), Component Location.

Table 6—9. Model 2761 Dual MF Input (AGC), A2 (96588) for Options 4 and 5 Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1-4	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C5	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C6	15UF		10%	10V	KEMET	T330A156K010AS	310001560
C7	22PF	S2LTC	10%	1KV	CENTRALAB	DD-220	330002200
C8	.22UF		10%	50V	KEMET	T330A224K050AS	310002240
C9-11	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C12-15	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C16	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C17	15UF		10%	10V	KEMET	T330A156K010AS	310001560
C18	22PF	S2LTC	10%	1KV	CENTRALAB	DD-220	330002200
C19	.22UF		10%	50V	KEMET	T330A224K050AS	310002240
C20-22	10UF		10%	10V	KEMET	T330A106K010AS	310001060
CR1-6	DO35	500MW		75V	FAIRCHILD	1N4148	560041480
Q1	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
Q2	TO92 TO 92			400V	MOTOROLA	MPF152 2N5461	555001520
Q3-4	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
Q5	TO92 TO 92			400V	MOTOROLA	MPF152 2N5461	555001520
Q6	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
R1	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R2	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R3	22K	1/4W	10%		AB	TYPE CB	200102236
R4	1K	1/4W	10%		AB	TYPE CB	200101026
R5	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R6	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R7	22K	1/4W	10%		AB	TYPE CB	200102236
R8	1K	1/4W	10%		AB	TYPE CB	200101026
R9	3.9K	1/4W	10%		AB	TYPE CB	200103926
R10	1.8K	1/4W	10%		AB	TYPE CB	200101826
R11	10K	1/4W	10%		AB	TYPE CB	200101036
R12	100K	1/4W	10%		AB	TYPE CB	200101046
R13-14	47K	1/4W	10%		AB	TYPE CB	200104736
R15	1.5K	1/4W	10%		AB	TYPE CB	200101526
R16	470-	1/4W	10%		AB	TYPE CB	200104716
R17	10-	1/4W	10%		AB	TYPE CB	200101006
R18	1.5M	1/4W	10%		AB	TYPE CB	200101556
R19	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R20	3.3K	1/4W	10%		AB	TYPE CB	200103326
R21-22	1.5K	1/4W	10%		AB	TYPE CB	200101526
R23	2.2K	1/4W	10%		AB	TYPE CB	200102226
R24	3.3K	1/4W	10%		AB	TYPE CB	200103326
R25	2.2K	1/4W	10%		AB	TYPE CB	200102226
R26	120-	1/4W	10%		AB	TYPE CB	200101216
R27	1K	1/4W	10%		AB	TYPE CB	200101026
R28	1.5K	1/4W	10%		AB	TYPE CB	200101526
R29	120-	1/4W	10%		AB	TYPE CB	200101216
R30	2.2K	1/4W	10%		AB	TYPE CB	200102226
R31	6.8K	1/4W	10%		AB	TYPE CB	200106826
R32	27K	1/4W	10%		AB	TYPE CB	200102736
R33	4.7M	1/4W	10%		AB	TYPE CB	200104756
R34	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R35	22K	1/4W	10%		AB	TYPE CB	200102236

Table 6—9. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R36	3.9M	1/4W	10%		AB	TYPE CB	200103956
R37	100K	1/4W	10%		AB	TYPE CB	200101046
R38-39	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R40	12.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212121
R41	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R42	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R43	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R44	22K	1/4W	10%		AB	TYPE CB	200102236
R45	1K	1/4W	10%		AB	TYPE CB	200101026
R46	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R47	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R48	22K	1/4W	10%		AB	TYPE CB	200102236
R49	1K	1/4W	10%		AB	TYPE CB	200101026
R50	3.9K	1/4W	10%		AB	TYPE CB	200103926
R51	1.8K	1/4W	10%		AB	TYPE CB	200101826
R52	10K	1/4W	10%		AB	TYPE CB	200101036
R53	100K	1/4W	10%		AB	TYPE CB	200101046
R54-55	47K	1/4W	10%		AB	TYPE CB	200104736
R56	1.5K	1/4W	10%		AB	TYPE CB	200101526
R57	470-	1/4W	10%		AB	TYPE CB	200104716
R58	10-	1/4W	10%		AB	TYPE CB	200101006
R59	1.5M	1/4W	10%		AB	TYPE CB	200101556
R60	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R61	3.3K	1/4W	10%		AB	TYPE CB	200103326
R62-63	1.5K	1/4W	10%		AB	TYPE CB	200101526
R64	2.2K	1/4W	10%		AB	TYPE CB	200102226
R65	3.3K	1/4W	10%		AB	TYPE CB	200103326
R66	2.2K	1/4W	10%		AB	TYPE CB	200102226
R67	120-	1/4W	10%		AB	TYPE CB	200101216
R68	1K	1/4W	10%		AB	TYPE CB	200101026
R69	1.5K	1/4W	10%		AB	TYPE CB	200101526
R70	120-	1/4W	10%		AB	TYPE CB	200101216
R71	2.2K	1/4W	10%		AB	TYPE CB	200102226
R72	6.8K	1/4W	10%		AB	TYPE CB	200106826
R73	27K	1/4W	10%		AB	TYPE CB	200102736
R74	4.7M	1/4W	10%		AB	TYPE CB	200104756
R75	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R76	22K	1/4W	10%		AB	TYPE CB	200102236
R77	3.9M	1/4W	10%		AB	TYPE CB	200103956
R78	100K	1/4W	10%		AB	TYPE CB	200101046
RV1-2	SILICON				SCHAUER	SV-1	565510000
U1-5	8PDIL	80MW		180	SIGNETICS	N5558V	500055580
U6-7	2PTO5M				RCA	CA3026	500030260
XQ1-6	SKT				ELCO	05-3303	826600100
XU1	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400
XU2	SKT IC LOW PROF 8PDIL				AMP	583640-1	820000400
XU3	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400
XU4-5	SKT IC 12P PC TO5 TEFLON				AUGAT	8058-1G55	820200200

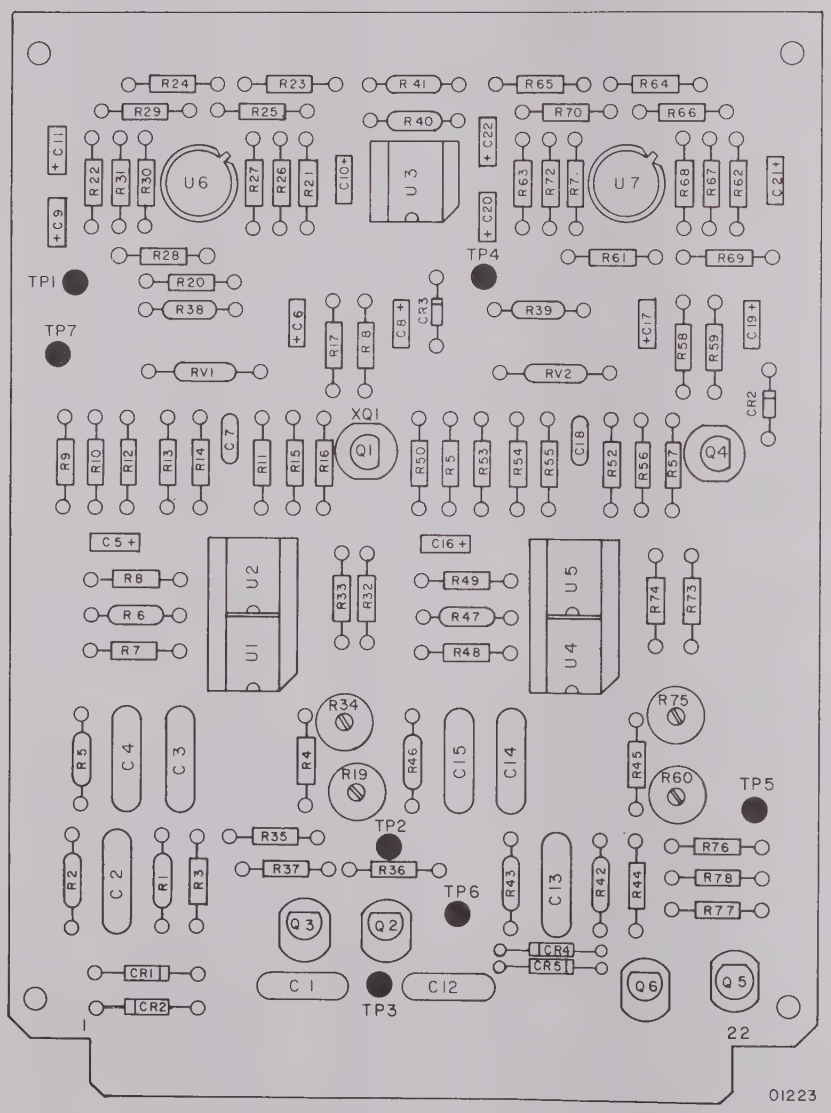


Figure 6—4. Model 2761 Dual MF Input (AGC), A2 (96588) of Options 4 and 5, Component Location.

Table 6—10. Model 2761 Main Input, A3 (96592) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1-2	50UF			16V	SPRAGUE	TE1160	300205C60
C3	.01UF		10%	100V	SPRAGUE	225P10391WD3	32C001030
C4	.022UF		10%	100V	SPRAGUE	225P22391WD3	32C002230
C5	.0022UF		10%	100V	SPRAGUE	225P22291WD3	32C002220
C6	.022UF		10%	100V	SPRAGUE	225P22391WD3	32C002230
C7	.022UF		10%	100V	SPRAGUE	225P22391WD3	32C002230
C8	.0022UF		10%	100V	SPRAGUE	225P22291WD3	32C002220
C9	.022UF		10%	100V	SPRAGUE	225P22391WD3	32C002230
C10	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C11-12	.047UF		10%	100V	SPRAGUE	225P47391WD3	32C004730
C13	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C14	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C15	.001UF		10%	100V	SPRAGUE	225P10291WD3	32C001020
C16	20UF			15V	TSI	PA20FF15NP	301302060
CR1-11	DO35	500MW		75V	FAIRCHILD	1N4148	56C041480
F1	1/8A				LITTELFUSE	275.125	863200900
K1	1A PC MINI				D. RANDALL	377025	6041013C0
Q1	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
Q2	TO92 TO 92			400V	MOTOROLA	MPF152 2N5461	555001520
Q3-4	TO92HSS	310MW		40V	MOTOROLA	2N3903	55C039030
Q5	TO5HNS	1W		65V	RCA	2N2102	55C021020
Q6	TO5MSS	5W		65V	RCA	2N4036	552040360
Q7-8	TO92HSS	310MW		40V	MOTOROLA	2N3903	55C039030
Q9-10	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
R1	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
R2-3	162-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220216201
R4	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
R5-6	16.2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220216221
R7	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R8	22K	1/4W	10%		AB	TYPE CB	200102236
R9-10	1M	1/4W	10%		AB	TYPE CB	200101056
R11-14	10K	1/4W	10%		AB	TYPE CB	200101036
R15	17.8K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220217821
R16	383K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238331
R17	4.7K	1/4W	10%		AB	TYPE CB	200104726
R18	18K	1/4W	10%		AB	TYPE CB	200101836
R19	3.3K	1/4W	10%		AB	TYPE CB	200103326
R20	22K	1/4W	10%		AB	TYPE CB	200102236
R21	4.7K	1/4W	10%		AB	TYPE CB	200104726
R22	17.8K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220217821
R23	383K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238331
R24	4.7K	1/4W	10%		AB	TYPE CB	200104726
R25	18K	1/4W	10%		AB	TYPE CB	200101836
R26	3.3K	1/4W	10%		AB	TYPE CB	200103326
R27	47K	1/4W	10%		AB	TYPE CB	200104736
R28	22K	1/4W	10%		AB	TYPE CB	200102236
R29-30	39-	1/2W	5%		AB	TYPE EB	200203905
R31	3.3K	1/4W	10%		AB	TYPE CB	200103326
R32	1.8K	1/4W	10%		AB	TYPE CB	200101826

Table 6—10. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R33	8.2K	1/4W	10%		AB	TYPE CB	200108226
R34	4.7K	1/4W	10%		AB	TYPE CB	200104726
R35	10K	1/4W	10%		AB	TYPE CB	200101036
R36-37	3.3K	1/4W	10%		AB	TYPE CB	200103326
R38	4.7K	1/4W	10%		AB	TYPE CB	200104726
R39	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R40	14.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220214721
R41	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R42-43	100K	1/4W	10%		AB	TYPE CB	200101046
R44	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R45	12.4K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212421
R46-48	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R49	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R50	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
R51	10K	1/2W	10%	200V	HELIPOT	62PR10K	232701036
R52	220-	1/4W	10%		AB	TYPE CB	200102216
R53	22-	1/4W	10%		AB	TYPE CB	200102206
R54	4.7K	1/4W	10%		AB	TYPE CB	200104726
RV1-2	SILICON				SCHAUER	SV-1	565510000
T1-2	P20-30K S800-1200 AUDIO P				UTC	SO-7P	400300100
U1-5	8PDIL	80MW		180	SIGNETICS	N5558V	500055580
XU1-5	SKT IC LOW PROF 8PDIL				AMP	583640-1	820000400

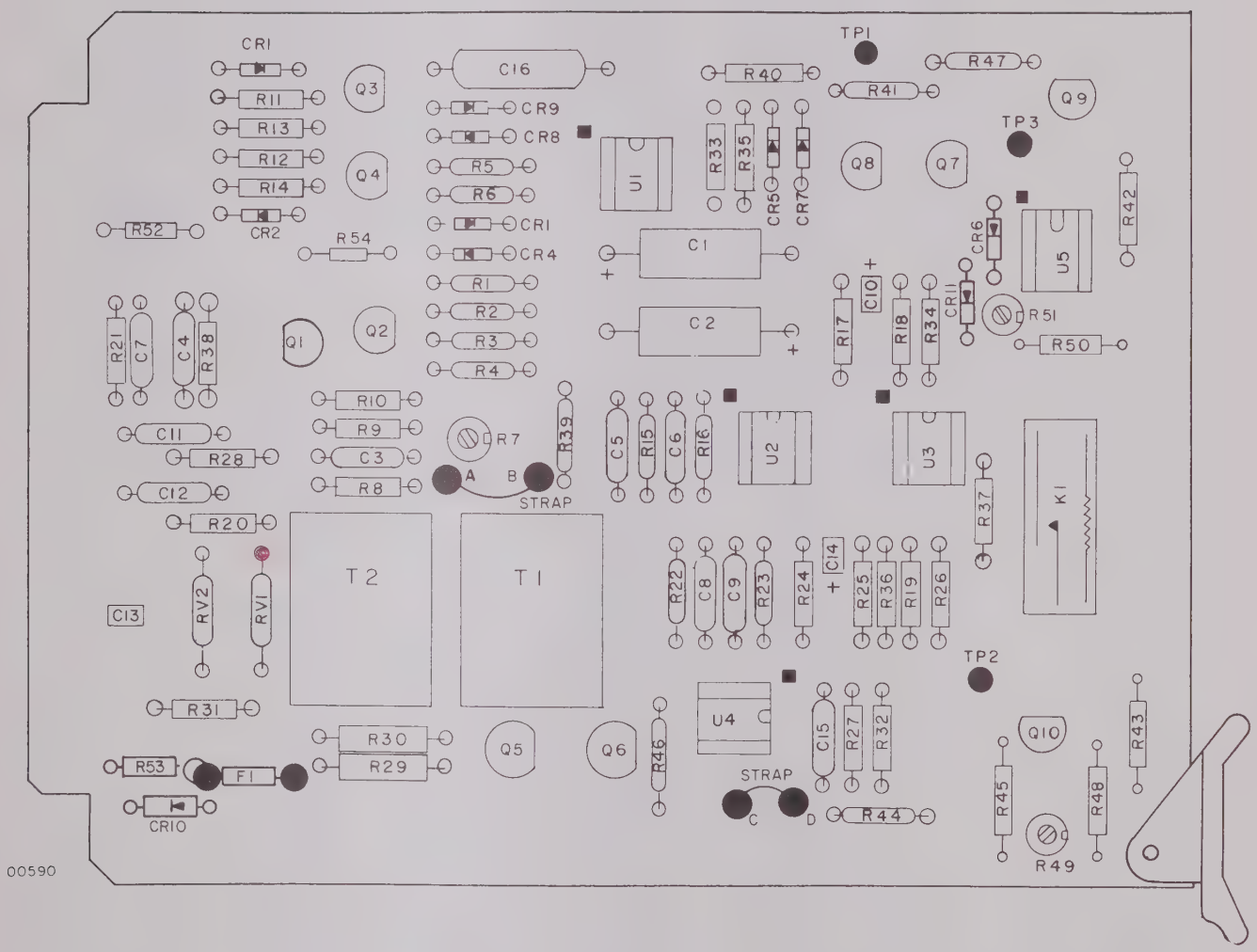


Figure 6—5. Model 2761 Main Input, A3 (96592), Component Location.

Table 6—11. Model 2761 Quad SF (VF) Detector, A4 (96590) Options 4-5, Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C2-5	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C6	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C7-8	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C9	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C10-13	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C14	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C15-16	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C17	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C18-21	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C22	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C23-24	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C25	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C26-29	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C30	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C31-32	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
CR1-12	DO35	500MW		75V	FAIRCHILD	1N4148	560041480
Q1-4	TO92HSS	310MW		40V	MOTOROLA	2N3903	550039030
R1	100K	1/4W	10%		AB	TYPE CB	200101046
R2	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R3	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R4-5	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R6-7	6340-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220263411
R8	100K	1/4W	10%		AB	TYPE CB	200101046
R9	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R10	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R11-12	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R13-14	6340-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220263411
R15	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R16	100-	1/4W	10%		AB	TYPE CB	200101016
R17	100K	1/4W	10%		AB	TYPE CB	200101046
R18	1M	1/4W	10%		AB	TYPE CB	200101056
R19-21	100K	1/4W	10%		AB	TYPE CB	200101046
R22	10K	1/4W	10%		AB	TYPE CB	200101036
R23	100K	1/4W	10%		AB	TYPE CB	200101046
R24	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R25	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R26-27	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R28-29	5900-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220259011
R30	100K	1/4W	10%		AB	TYPE CB	200101046
R31	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R32	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R33-34	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R35-36	5.76K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220257611
R37	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R38	100-	1/4W	10%		AB	TYPE CB	200101016
R39	100K	1/4W	10%		AB	TYPE CB	200101046
R40	1M	1/4W	10%		AB	TYPE CB	200101056
R41-43	100K	1/4W	10%		AB	TYPE CB	200101046
R44	10K	1/4W	10%		AB	TYPE CB	200101036
R45	100K	1/4W	10%		AB	TYPE CB	200101046

Table 6—11. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R46	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R47	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R48-49	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R50-51	6340-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220263411
R52	100K	1/4W	10%		AB	TYPE CB	200101046
R53	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R54	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R55-56	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R57-58	6340-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220263411
R59	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R60	100-	1/4W	10%		AB	TYPE CB	200101016
R61	100K	1/4W	10%		AB	TYPE CB	200101046
R62	1M	1/4W	10%		AB	TYPE CB	200101056
R63-65	100K	1/4W	10%		AB	TYPE CB	200101046
R66	10K	1/4W	10%		AB	TYPE CB	200101036
R67	100K	1/4W	10%		AB	TYPE CB	200101046
R68	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R69	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R70-71	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R72-73	5900-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220259011
R74	100K	1/4W	10%		AB	TYPE CB	200101046
R75	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R76	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R77	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R78	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R79-80	5.76K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220257611
R81	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R82	100-	1/4W	10%		AB	TYPE CB	200101016
R83	100K	1/4W	10%		AB	TYPE CB	200101046
R84	1M	1/4W	10%		AB	TYPE CB	200101056
R85-87	100K	1/4W	10%		AB	TYPE CB	200101046
R88	10K	1/4W	10%		AB	TYPE CB	200101036
U1-8	8PDIL	80MW		180	SIGNETICS	N5558V	500055580
XU1-4	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400

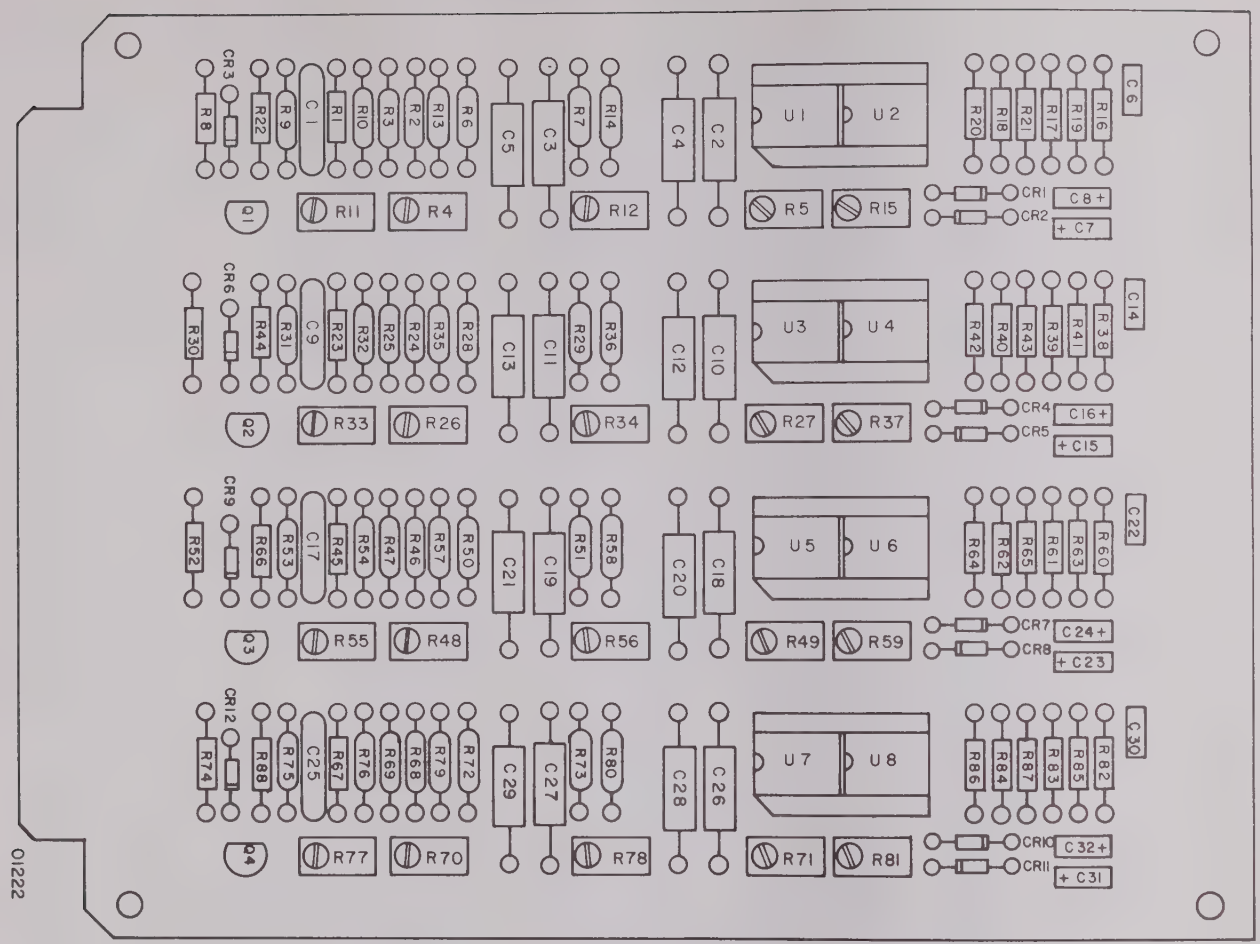


Figure 6—6. Model 2761 Quad SF (VF) Detector, A4 (96590), Component Location.

Table 6—12. Model 2761 Triple MF Selective Detector, A5 (96568) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C2-5	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C6	1.0UF	Y5V	TC 20%	50V	ERIE	8131-050-651-105M	330801050
C7-8	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C9	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C10-13	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C14	1.0UF	Y5V	TC 20%	50V	ERIE	8131-050-651-105M	330801050
C15-16	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C17	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C18-21	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C22	1.0UF	Y5V	TC 20%	50V	ERIE	8131-050-651-105M	330801050
C23-24	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
CR1-3	DO35	500MW		75V	FAIRCHILD	1N4148	560041480

Table 6—12. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
Q1	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150
Q2	TO92AFA	310MW		40OV	FAIRCHILD	2N3569	550035690
Q3	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150
Q4	TO92AFA	310MW		40OV	FAIRCHILD	2N3569	550035690
Q5	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150
Q6	TO92AFA	310MW		40OV	FAIRCHILD	2N3569	550035690
R1	100K	1/4W	10%		AB	TYPE CB	200101046
R2	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R3	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R4-5	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R6-7	23.2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220223221
R8	100K	1/4W	10%		AB	TYPE CB	200101046
R9	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R10	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R11-12	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R13-14	21.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220221521
R15	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R16	100-	1/4W	10%		AB	TYPE CB	200101016
R17	1M	1/4W	10%		AB	TYPE CB	200101056
R18-21	100K	1/4W	10%		AB	TYPE CB	200101046
R22	220K	1/4W	10%		AB	TYPE CB	200102246
R23	10K	1/4W	10%		AB	TYPE CB	200101036
R24	100K	1/4W	10%		AB	TYPE CB	200101046
R25	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R26	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R27-28	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R29-30	17.4K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220217421
R31	100K	1/4W	10%		AB	TYPE CB	200101046
R32	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R33	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R34-35	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R36-37	16.9K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220216921
R38	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R39	100-	1/4W	10%		AB	TYPE CB	200101016
R40	1M	1/4W	10%		AB	TYPE CB	200101056
R41-44	100K	1/4W	10%		AB	TYPE CB	200101046
R45	220K	1/4W	10%		AB	TYPE CB	200102246
R46	10K	1/4W	10%		AB	TYPE CB	200101036
R47	100K	1/4W	10%		AB	TYPE CB	200101046
R48	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R49	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R50-51	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R52-53	14.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220214321
R54	100K	1/4W	10%		AB	TYPE CB	200101046
R55	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R56	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R57-58	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R59-60	13.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220213721
R61	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R62	100-	1/4W	10%		AB	TYPE CB	200101016
R63	1M	1/4W	10%		AB	TYPE CB	200101056
R64-67	100K	1/4W	10%		AB	TYPE CB	200101046
R68	220K	1/4W	10%		AB	TYPE CB	200102246
R69	10K	1/4W	10%		AB	TYPE CB	200101036
U1-6	8PDIL	80MW		18O	SIGNETICS	N5558V	500055580
XU1-6	SKT IC LOW PROF 8PDIL				AMP	583640-1	820000400

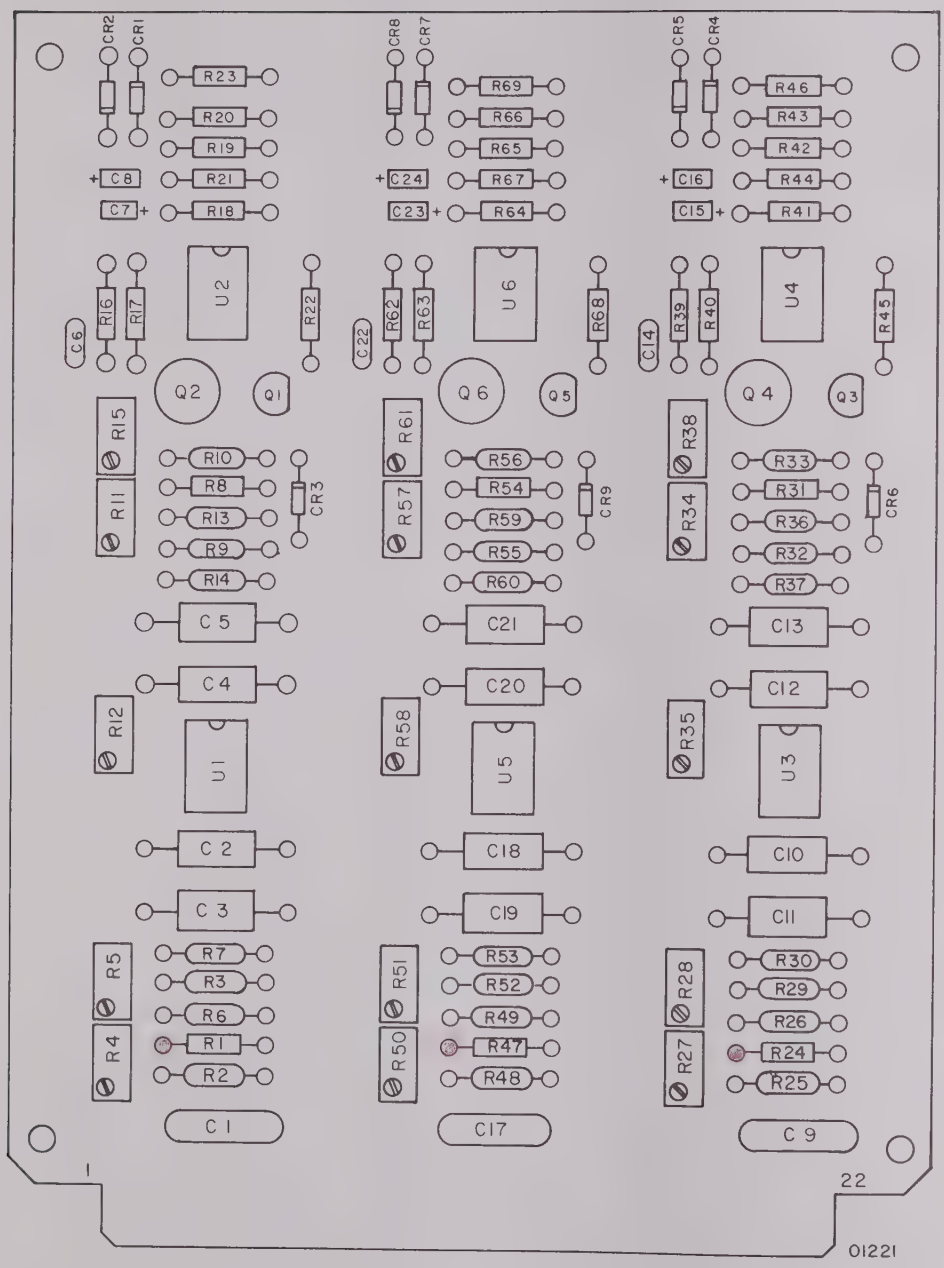


Figure 6—7. Model 2761 Triple MF Selective Detector, A5 and A6 (96568), Component Location.

Table 6—13. Model 2761 Triple MF Selective Detector A6 (96568) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.01UF		10%	100V	SPRAGUE	225P10391WD3	32C001030
C2-5	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C6	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C7-8	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C9	.01UF		10%	100V	SPRAGUE	225P10391WD3	32C001030
C10-13	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C14	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C15-16	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C17	.01UF		10%	100V	SPRAGUE	225P10391WD3	32C001030
C18-21	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C22	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C23-24	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
CR1-9	DO35	500MW		75V	FAIRCHILD	1N4148	56C041480
Q1	TO92AFA	310MW		25V	MOTOROLA	MPS6515	55C065150
Q2	TO92AFA	310MW		400V	FAIRCHILD	2N3569	55C035690
Q3	TO92AFA	310MW		25V	MOTOROLA	MPS6515	55C065150
Q4	TO92AFA	310MW		400V	FAIRCHILD	2N3569	55C035690
Q5	TO92AFA	310MW		25V	MOTOROLA	MPS6515	55C065150
Q6	TO92AFA	310MW		400V	FAIRCHILD	2N3569	55C035690
R1	100K	1/4W	10%		AB	TYPE CB	200101046
R2	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R3	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R4-5	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R6-7	12.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212121
R8	100K	1/4W	10%		AB	TYPE CB	200101046
R9	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R10	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R11-12	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R13-14	11.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211521
R15	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R16	100-	1/4W	10%		AB	TYPE CB	200101016
R17	1M	1/4W	10%		AB	TYPE CB	200101056
R18-21	100K	1/4W	10%		AB	TYPE CB	200101046
R22	220K	1/4W	10%		AB	TYPE CB	200102246
R23	10K	1/4W	10%		AB	TYPE CB	200101036
R24	100K	1/4W	10%		AB	TYPE CB	200101046
R25	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R26	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R27-28	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R29-30	10.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210521
R31	100K	1/4W	10%		AB	TYPE CB	200101046
R32	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R33	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R34-35	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R36-37	10.2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210221
R38	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R39	100-	1/4W	10%		AB	TYPE CB	200101016
R40	1M	1/4W	10%		AB	TYPE CB	200101056
R41-44	100K	1/4W	10%		AB	TYPE CB	200101046
R45	220K	1/4W	10%		AB	TYPE CB	200102246
R46	10K	1/4W	10%		AB	TYPE CB	200101036

Table 6—13. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R47	100K	1/4W	10%		AB	TYPE CB	200101046
R48	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R49	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R50-51	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R52-53	9.31K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220293111
R54	100K	1/4W	10%		AB	TYPE CB	200101046
R55	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R56	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R57-58	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R59-60	8.87K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220288711
R61	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R62	100-	1/4W	10%		AB	TYPE CB	200101016
R63	1M	1/4W	10%		AB	TYPE CB	200101056
R64-67	100K	1/4W	10%		AB	TYPE CB	200101046
R68	220K	1/4W	10%		AB	TYPE CB	200102246
R69	10K	1/4W	10%		AB	TYPE CB	200101036
U1-6	8PDIL	80MW		180	SIGNETICS	N5558V	500055580
XU1-6	SKT IC LOW PROF 8PDIL				AMP	583640-1	820000400

Table 6—14. Model 2761 Error Detector, A7 (96554) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1-2	.47UF		10%	50V	KEMET	T330A474K050AS	31C004741
C3	4.7UF		10%	25V	KEMET	T330A475K025AS	31C004751
C6	10UF		10%	10V	KEMET	T330A106K010AS	31C001060
C7	22UF		10%	6V	KEMET	T330A226K006AS	31C002260
C8-11	.01UF		CO	50V	CENTRALAB	CK-103	330701030
CR1-4	DO35	500MW		75V	FAIRCHILD	1N4148	56C041480
R1	5.6K	1/4W	10%		AB	TYPE CB	2C0105626
R2	28.7K	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22C228721
R3	6810-	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22C268111
R4	21.5K	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22C221521
R6	10K	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22C21C021
R7	2.7K	1/4W	10%		AB	TYPE CB	2C0102726
R8	1K	1/4W	10%		AB	TYPE CB	200101026
U1	14DIP				TI	SN7427N	51C074270
U2	14DILP				TI	SN7401N	51C074010
U3	16PDIL				FAIRCHILD	9602PC	510C96025
U4	14DILP				TI	SN74C0N	51C074CC0
U5	16PDIL				FAIRCHILD	9602PC	51CC96025
U6	14DILP				TI	SN74C0N	51C074CC0
U7	14DILP			5C0V	TI	SN7402N	51C074020
U10	14DILP				TI	SN7490AN	51C0749C0
U11	14DILP				TI	SN7406N	51C074060
U12	14DILP				TI	SN7406N	51CC74060
U13	16 DILP				TI	SN74174N	51C074174
XU1	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400

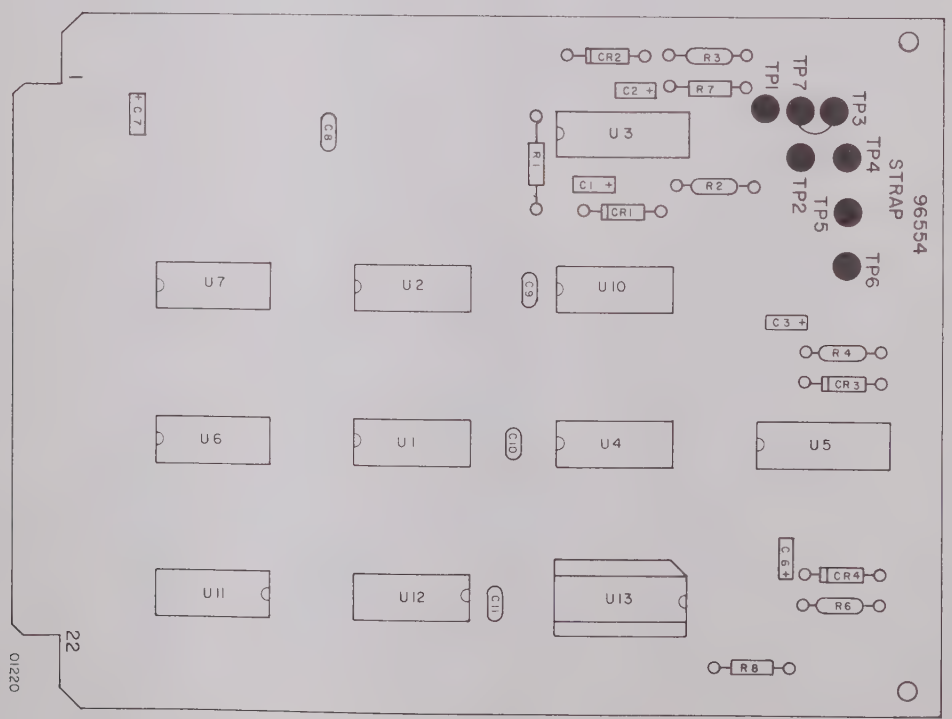


Figure 6—8. Model 2761 Error Detector, A7 (96554), Component Location.

Table 6—15. Model 2761 Error Detector, A7 (96554) for Options 4 and 5 Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.47UF		10%	50V	KEMET	T330A474K050AS	310004741
C2	.47UF		10%	50V	KEMET	T330A474K050AS	310004741
C3	4.7UF		10%	25V	KEMET	T330A475K025AS	310004751
C4	820PF		5%	100V	ELMENCO	CM15-E821J	335008210
C5	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C6	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C7	22UF		10%	6V	KEMET	T330A226K006AS	310002260
C8-11	.01UF		20	50V	CENTRALAB	CK-103	330701030
CR1-4	DO35	500MW		75V	FAIRCHILD	1N4148	560041480
R1	5.6K	1/4W	10%		AB	TYPE CB	200105626
R2	28.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220228721
R3	6810-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220268111
R4	21.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220221521
R5	68.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220268121
R6	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R7	2.7K	1/4W	10%		AB	TYPE CB	200102726
R8	1K	1/4W	10%		AB	TYPE CB	200101026
U1	14DIP				TI	SN7427N	510074270
U2	14DILP				TI	SN7401N	510074010
U3	16PDIL				FAIRCHILD	9602PC	510096025
U4	14DILP				TI	SN7400N	510074000
U5	16PDIL				FAIRCHILD	9602PC	510096025
U6	14DILP				TI	SN7400N	510074000
U7	14DILP			500V	TI	SN7402N	510074020
U8	8DILP			5-15	SIGNETICS	SE555V	510000555
U9	14DILP				TI	SN7472N	510074720
U10	14DILP				TI	SN7490AN	510074900
U11	14DILP				TI	SN7406N	510074060
U12	14DILP				TI	SN7406N	510074060
U13	16 DILP				TI	SN74174N	510074174
XU1	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400
XU2	SKT IC LOW PROF 8PDIL				AMP	583640-1	820000400

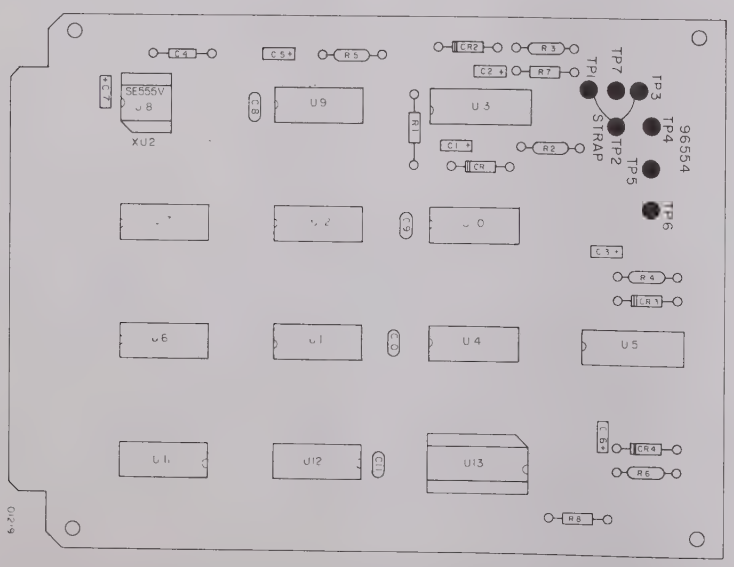


Figure 6—9. Model 2761 Error Detector, A7 (96554) for Options 4 and 5, Component Location.

Table 6—16. Model 2761 MF Decoder , A8 (95874) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R1	2.2K	1/4W	10%		AB	TYPE CB	2C0102226
R2	2.2K	1/4W	10%		AB	TYPE CB	2C0102226
R3	2.2K	1/4W	10%		AB	TYPE CB	2C0102226
R4	2.2K	1/4W	10%		AB	TYPE CB	2C0102226
R5	2.2K	1/4W	10%		AB	TYPE CB	2C0102226
R6	2.2K	1/4W	10%		AB	TYPE CB	2C0102226
R7	10K	1/4W	10%		AB	TYPE CB	2C0101036
U1	14DILP				MOTOROLA	MC9718P	512097180
U2	14DILP				SIGNETICS	SP377A	51C003770
U3	14DILP				SIGNETICS	SP377A	51C003770
U4	14DILP				SIGNETICS	SP377A	51C003770
U5	14DILP				SIGNETICS	SP377A	51C003770
U6	14DILP				SIGNETICS	SP377A	51C003770
U7	14DILP				SIGNETICS	SP384A	51C003840
U8	14DILP				SIGNETICS	SP384A	51C003840
U9	14DILP				SIGNETICS	SP384A	51C003840
U10	14DILP				SIGNETICS	SP384A	51C003840
U11	14DILP				TI	SN7430N	51C074300
U12	14DILP				TI	SN7420N	51C074200
U13	14DILP				TI	SN7400N	51C074000
U14	14DILP				SIGNETICS	SP314A	51C003140
U15	14PDIL				TI	SN7403N	51C074030

Table 6—17. Model 2761 MF Decoder Options 4 and 5, A8 (95874) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R1-6	2.2K	1/4W	10%		AB	TYPE CB	200102226
R7	10K	1/4W	10%		AB	TYPE CB	200101036
U1	14DILP				MOTOROLA	MC9718P	512097180
U2-6	14DILP				SIGNETICS	SP377A	510003770
U7-10	14DILP				SIGNETICS	SP384A	510003840
U11	14DILP				TI	SN7430N	510074300
U12	14DILP				TI	SN7420N	510074200
U13	14DILP				TI	SN74C0N	510074000
U14	14DILP				SIGNETICS	SP314A	510003140
U15	14PDIL				TI	SN7403N	510074030

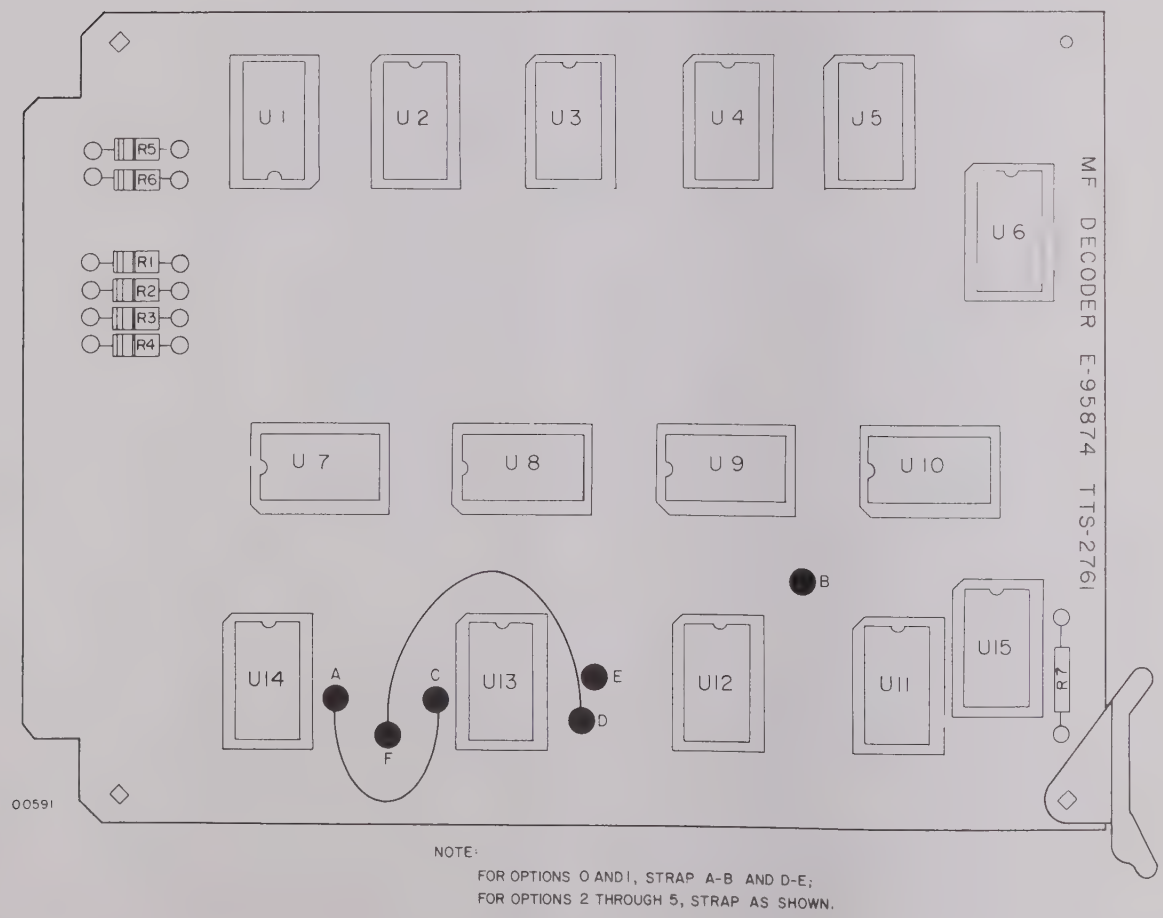


Figure 6—10. Model 2761 MF Decoder, A8 (95874), Component Location.

Table 6—18. Model 2761 Register, A9 (96591) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1-2	SEL VAL				KEMET	T330A	31CCCCCCO
C3	1CCCPF	Z5RTC	10%	1KV	CENTRALAB	DD-1C2	33C001020
C4	.1UF	W5RTC	10%	50V	USCC	CW30C104K	330P01041
C5	1CCCPF	Z5RTC	10%	1KV	CENTRALAB	DD-1C2	33CC01C20
C6	4.7UF		10%	25V	KEMET	T330A475KC25AS	31CC04751
C7	4.7UF		10%	25V	KEMET	T330A475KC25AS	310004751
C8	22UF		10%	6V	KEMET	T330A226KCC6AS	31CC02260
C9-12	.C1UF		20%	16V	CENTRALAB	UK16-103	330701031
CR1-2	DO35	5CCMW		75V	FAIRCHILD	1N4148	56CC41480
Q1-3	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150
R1	28.7K	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22C228721
R2	1CK	1/4W	10%		AB	TYPE CB	2CC101036
R3	4.7K	1/4W	10%		AB	TYPE CB	2CC1C4726
R4	31.6K	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22C231621
R5	1CK	1/4W	10%		AB	TYPE CB	2CC101036
R6	47C-	1/4W	10%		AB	TYPE CB	2CC104716
R7	4.7K	1/4W	10%		AB	TYPE CB	2CC104726
R8	1CK	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22021C021
R9	4.7K	1/4W	10%		AB	TYPE CB	2CC1C4726
R10-11	19.6K	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	220219621
R12	18K	1/4W	10%		AB	TYPE CB	2CC101836
R13	3.3K	1/4W	10%		AB	TYPE CB	2CC103326
U1	DIL				TI	SN7413N14P	51CC74130
U2	16DILP				TI	SN74123N	51C074123
U3	14DILP				TI	SN74121N	51C074121
U4	14DIP				TI	SN7404N	51CC74C40
U5	14DILP				SIGNETICS	SP314A	51C003140
U6	14DILP				TI	SN7401N	51C074C10
U7	16DILP				TI	SN74123N	51C074123
U8-9	14DILP				TI	SN7474N	51CC74740
U10	14DILP				TI	SN74C1N	51C074010
XU1	14PDIL				AMP	583527 1	82010C3C0
XU2-3	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400

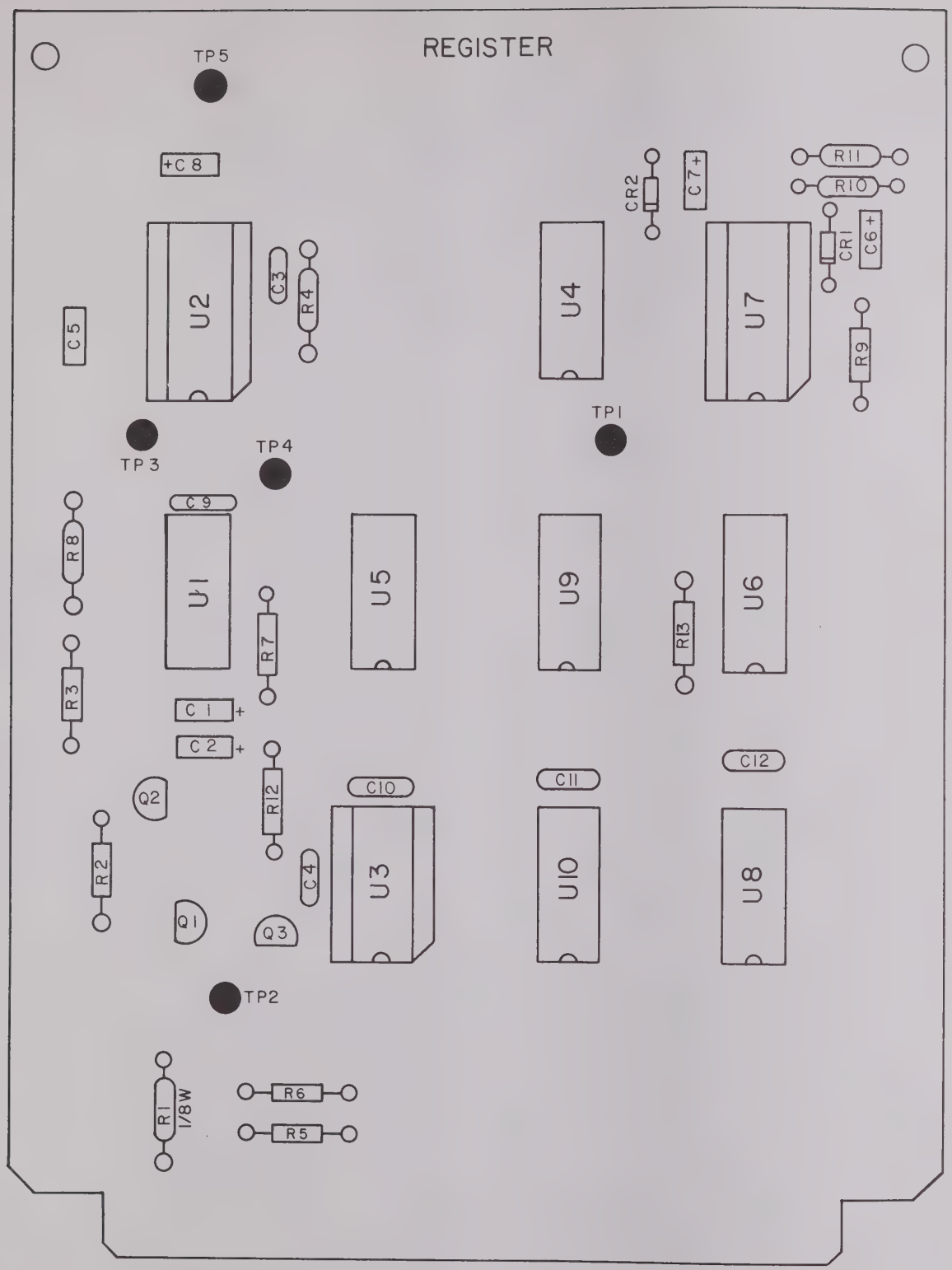


Figure 6—11. Model 2761 Register, A9 (96591), Component Location.

Table 6—19. Model 2761 Buffer, A11 (96551) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	22UF		10%	6V	KEMET	T330A226K006AS	310002260
CR1	DO35	500MW		75V	FAIRCHILD	1N4148	56C041480
K1	RELAY, FLAT, 2C PC				MICTEX	181-12A100	604104800
Q1	TO92MSS	310MW		40V	MOTOROLA	2N3905	552039050
R1	4.7K	1/4W	10%		AB	TYPE CB	200104726
R2	5.6K	1/4W	10%		AB	TYPE CB	200105626
R3	5.6K	1/4W	10%		AB	TYPE CB	200105626
R4	2.2K	1/4W	10%		AB	TYPE CB	200102226
R5	2.2K	1/4W	10%		AB	TYPE CB	200102226
R6-7	3.3K	1/4W	10%		AB	TYPE CB	200103326
R8	2.2K	1/4W	10%		AB	TYPE CB	200102226
R9	1K	1/4W	10%		AB	TYPE CB	200101026
R10	390-	1/4W	10%		AB	TYPE CB	200103916
R11	2.2K	1/4W	10%		AB	TYPE CB	200102226
R12	4.7K	1/4W	10%		AB	TYPE CB	200104726
R13	330-	1/4W	10%		AB	TYPE CB	200103316
R14-16	5.6K	1/4W	10%		AB	TYPE CB	200105626
R17-19	3.3K	1/4W	10%		AB	TYPE CB	200103326
R20	5.6K	1/4W	10%		AB	TYPE CB	200105626
R21	5.6K	1/4W	10%		AB	TYPE CB	200105626
R22	3.3K	1/4W	10%		AB	TYPE CB	200103326
U1	DILP				TI	SN7407N	510074070
U2	14DILP				TI	SN7405N	510074050
U3	DILP				TI	SN7407N	510074070
U4	14DILP				TI	SN7406N	510074060
U5	14DILP				TI	SN74C0N	510074CC0
U6	14DILP				SIGNETICS	SP384A	510003840
U7	14DILP				SIGNETICS	SP384A	510003840
U8	14DILP				TI	SN74C0N	510074CC0
U9	14DILP				TI	SN7400N	510074CC0

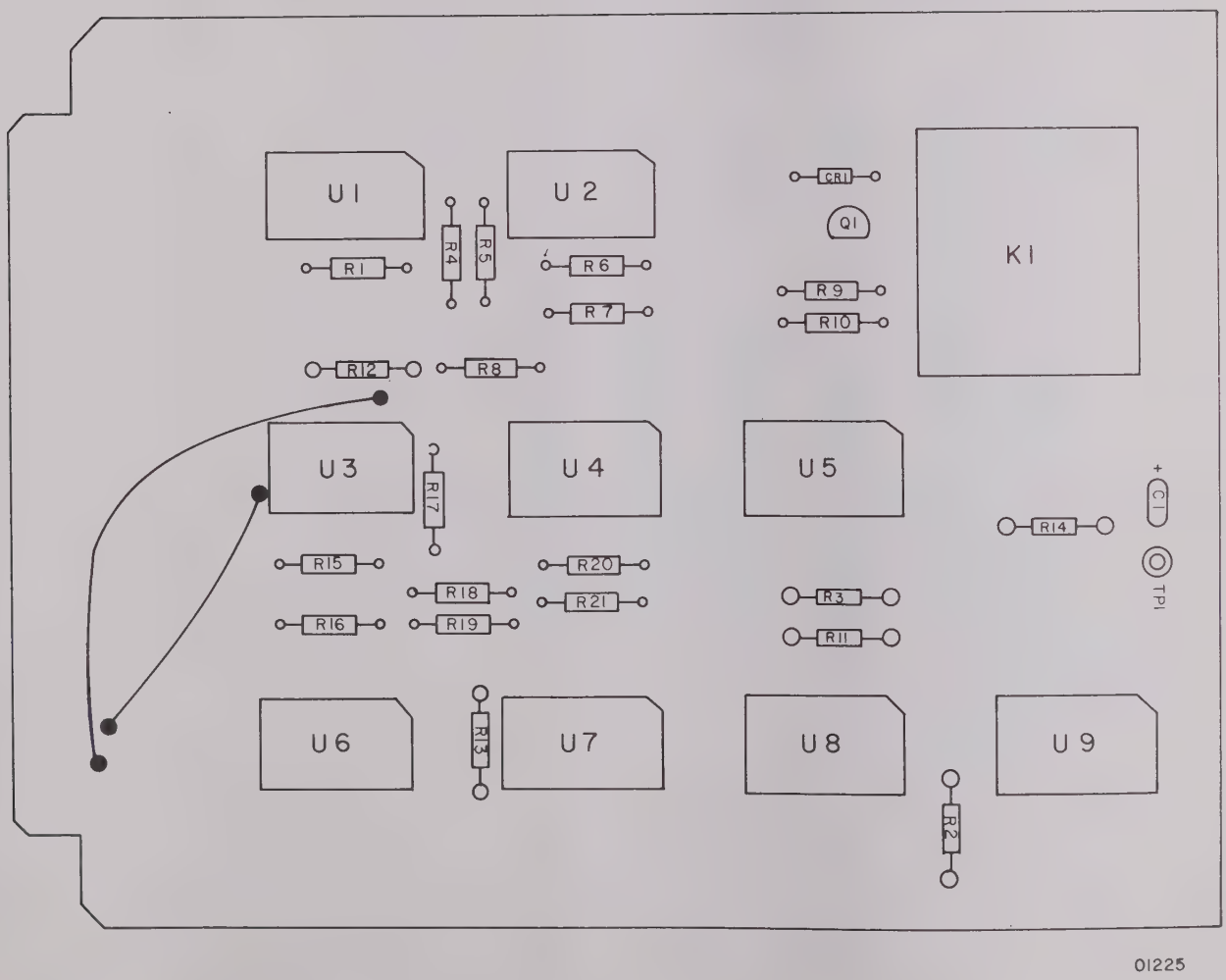


Figure 6—12. Model 2761 Buffer, A11 (96551), Component Location.

Table 6—20. Model 2761 Interconnection, A12 (96580) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
J20	34PIN				3M CC.	3431-1002	654002600
R1	47-	1/4W	10%		AB	TYPE CB	200104706

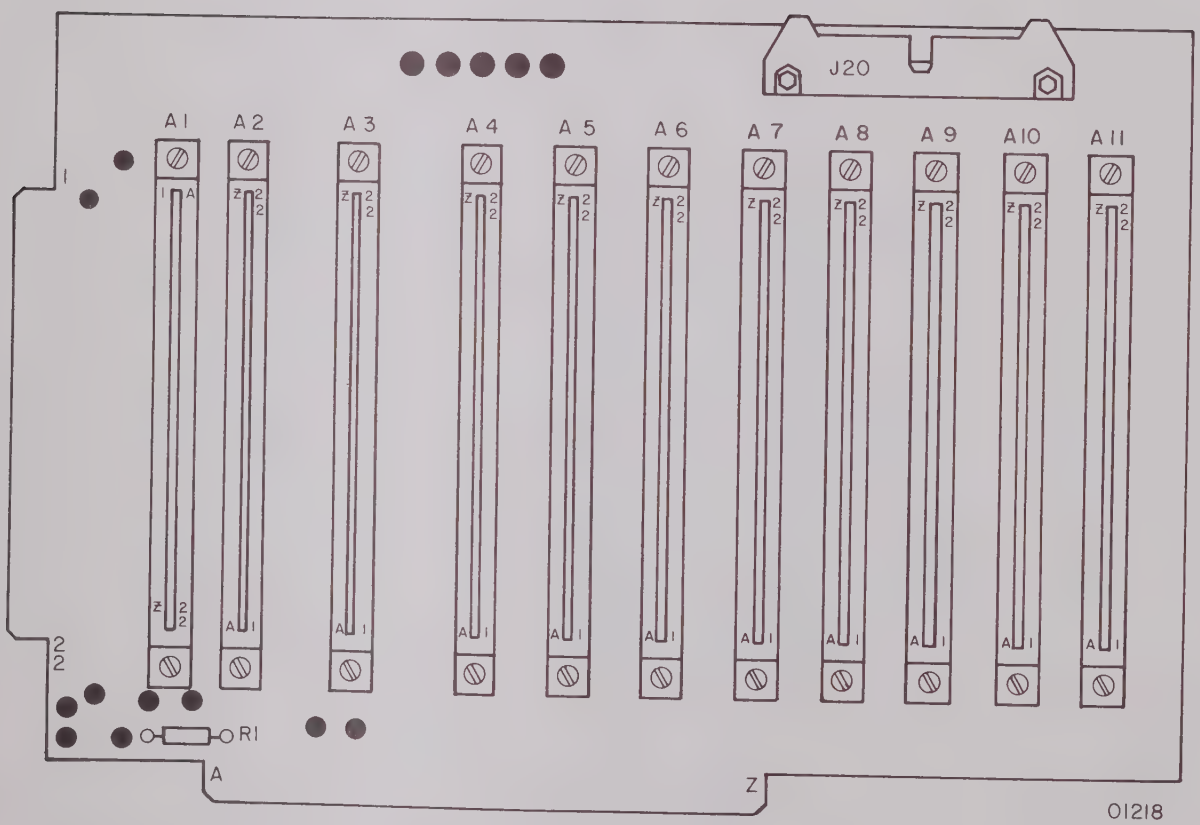


Figure 6—13. Model 2761 Interconnection, A12 (96580), Component Location.

Table 6—21. Model 2761 Code Lamp, A13 (95935) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1-6	LED	75MA		1.6V	LITRONIX	RED-LIT2	5645CC1C0
R1-6	1CC-	1/4W	10%		AB	TYPE CB	2001C1016

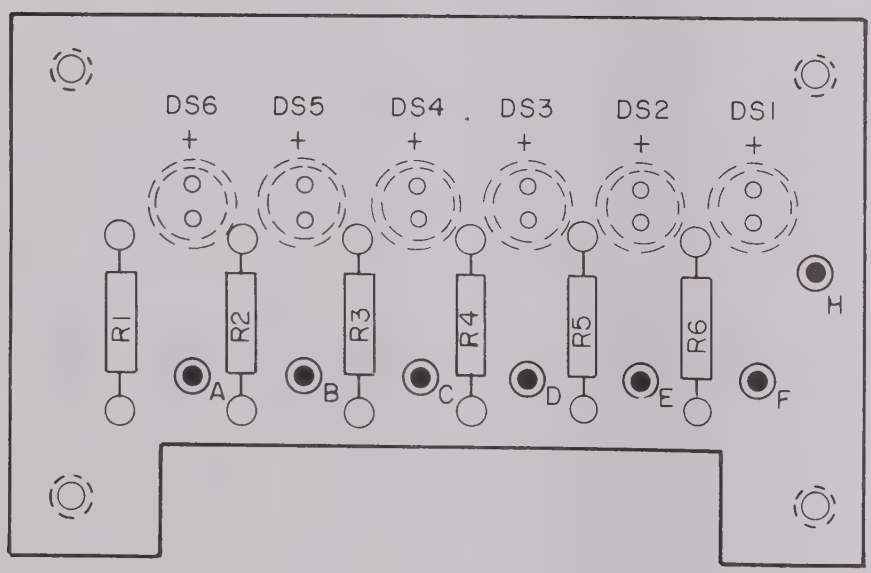
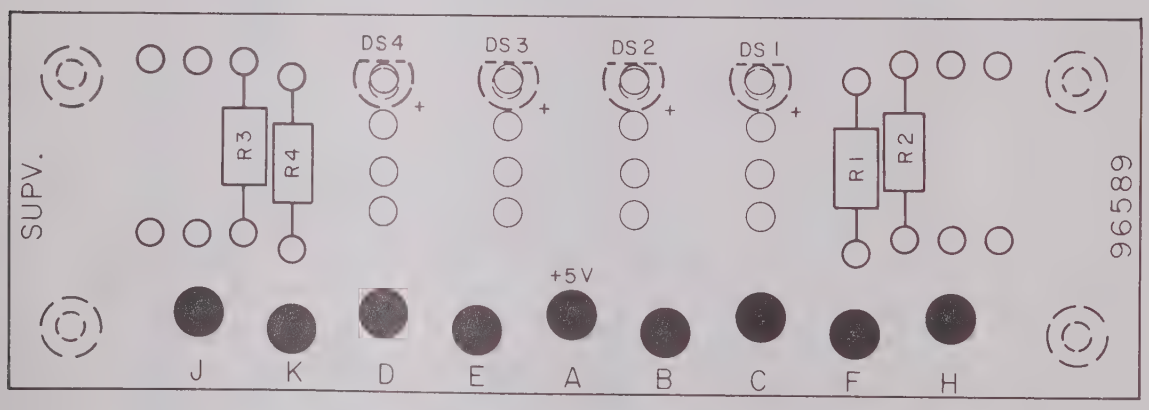


Figure 6—14. Model 2761 Code Lamp, A13 (95935), Component Location.

Table 6—22. Model 2761 Supervision Lamp, A14 (96589) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1-4	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
R1-4	100-	1/4W	10%		AB	TYPE CB	200101016

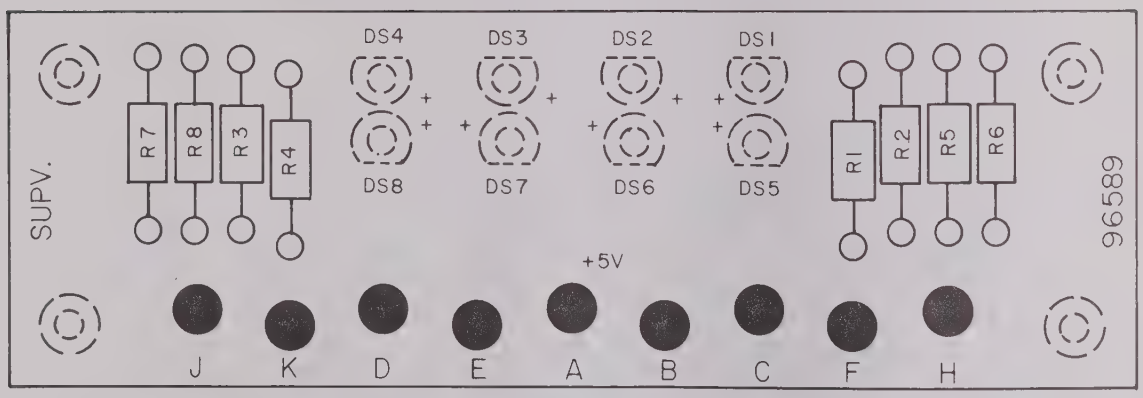


01229

Figure 6—15. Model 2761 Supervision Lamp, A14 (96589), Component Location.

Table 6—23. Model 2761 Supervision Lamp, A14 (96589) for Options 4 and 5 Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1-8	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
R1-8	100-	1/4W	10%		AB	TYPE CB	200101016



01228

Figure 6—16. Model 2761 Supervision Lamp, A14 (96589), for Options 4 and 5, Component Location.

Table 6—24. Model 2761 Frequency Lamp, A15 (95937) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1	LED	75MA		1.6V	LITRONIX	RED-LIT2	5645CC1C0
DS2	LED	75MA		1.6V	LITRONIX	RED-LIT2	5645CC1C0
DS3	LED	75MA		1.6V	LITRONIX	RED-LIT2	5645CC1C0
DS4	LED	75MA		1.6V	LITRONIX	RED-LIT2	5645CC1C0
DS5	LED	75MA		1.6V	LITRONIX	RED-LIT2	5645CC1C0
DS6	LED	75MA		1.6V	LITRONIX	RED-LIT2	5645CC1C0
R1	1CC-	1/4W	10%		AB	TYPE CB	2CC1C1016
R2	1CC-	1/4W	10%		AB	TYPE CB	2CC1C1016
R3	1CC-	1/4W	10%		AB	TYPE CB	2CC1C1016
R4	1CC-	1/4W	10%		AB	TYPE CB	2CC1C1016
R5	1CC-	1/4W	10%		AB	TYPE CB	2CC1C1016
R6	1CC-	1/4W	10%		AB	TYPE CB	2CC1C1016

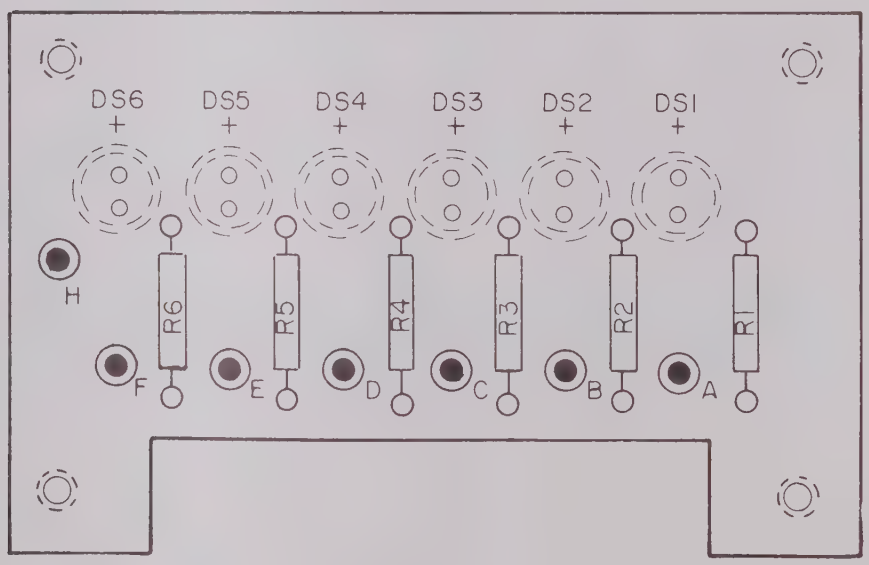
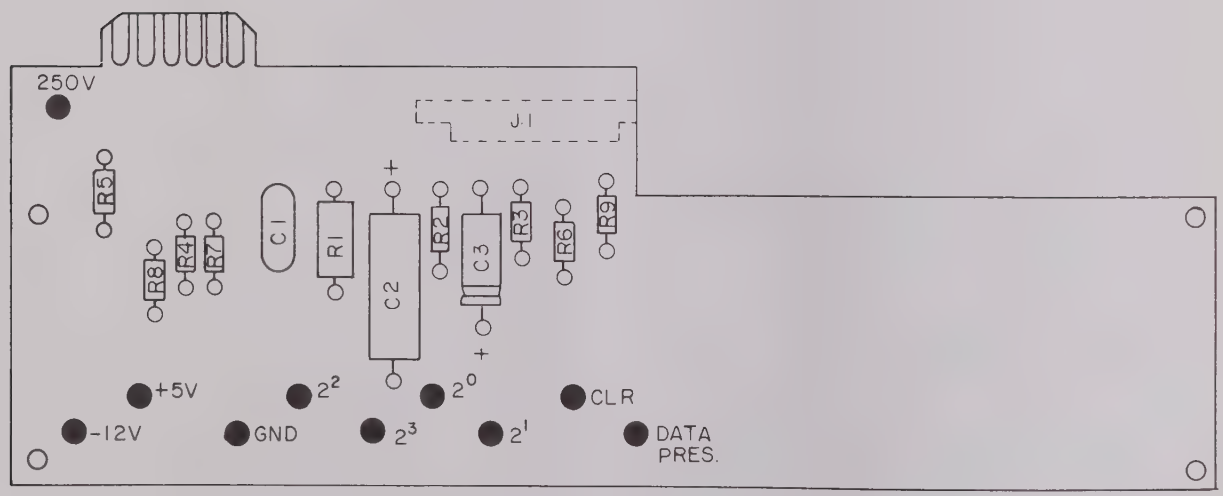


Figure 6—17. Model 2761 Frequency Lamp, A15 (95937), Component Location.

Table 6—25. Model 2761 Termination, A16 (95932) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.022UF		10%	400V	SPRAGUE	4PS-S22	321202230
C2	100UF			16V	SPRAGUE	TE-1162	300201071
C3	50UF			25V	SPRAGUE	TE1209	300205062
J1	10 PIN DUAL R/A PC				AMPHENOL	22521021105	651703600
R1	47K	1W	10%		AB	TYPE GB	200304736
R2	1K	1/4W	10%		AB	TYPE CB	200101026
R3	4.7K	1/4W	10%		AB	TYPE CB	200104726
R4	1.8K	1/4W	10%		AB	TYPE CB	200101826
R5	3.3K	1/4W	10%		AB	TYPE CB	200103326
R6	3.3K	1/4W	10%		AB	TYPE CB	200103326
R7	3.3K	1/4W	10%		AB	TYPE CB	200103326
R8	3.3K	1/4W	10%		AB	TYPE CB	200103326
R9	3.3K	1/4W	10%		AB	TYPE CB	200103326



00586

Figure 6—18. Model 2761 Termination, A16 (95932), Component Location.

Table 6—26. Model 2761 Accessory, A17 (96593) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
J21	34PIN				3M CO.	3431-2002	654C024C0
J23	33PIN	STUFFED			ELCO	8026-033-491-801	653206C00

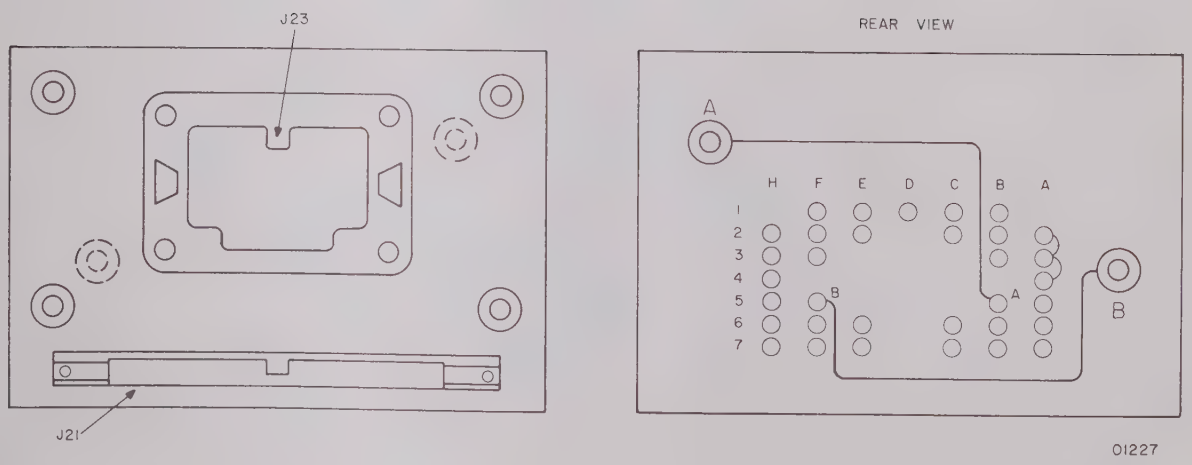


Figure 6—19. Model 2761 Accessory, A17 (96593), Component Location.

SECTION 7

SCHEMATIC DIAGRAMS

7.1 INTRODUCTION.

7.2 This section provides the schematic diagrams for the Model 2761 MF Signaling Display Unit. Figures 7—1 through 7—16 are the schematic diagrams.

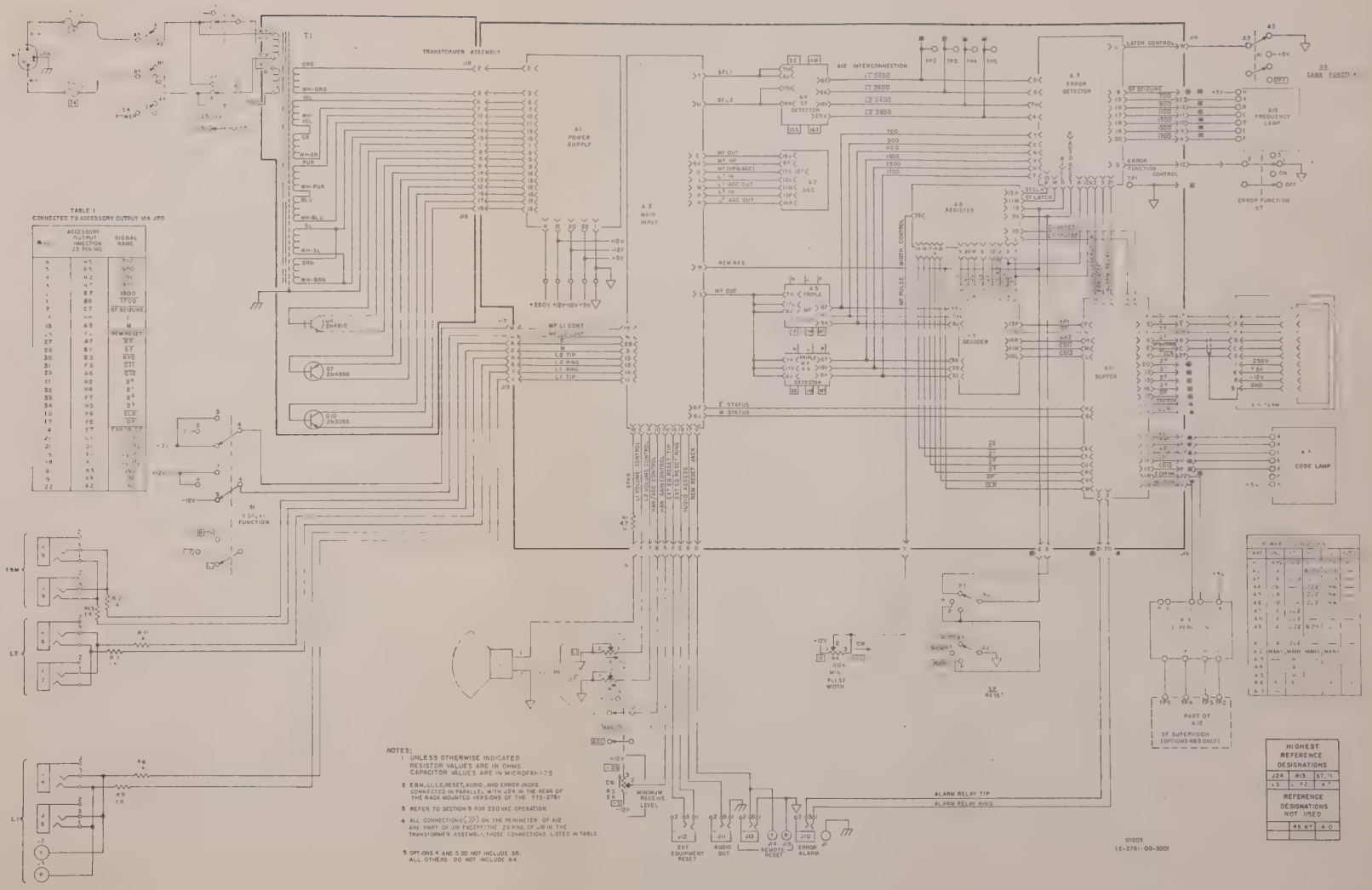


TABLE I
CONNECTED TO ACCESSORY OUTPUT VIA J20
ACCESSORY OUTPUT FUNCTION J3 PIN NO.
SIGNAL NAME
TRANSFORMER ASSEMBLY
A1 POWER SUPPLY
A3 MAIN INPUT
A12 INTERCONNECTION
A4 ST DETECTOR
A2 AGC
A7 ERROR DETECTOR
A9 REGISTER
A10 DECODER
A11 BUFFER
A5 TRIPLE DETECTOR
A8 FREQUENCY LAMP
A6 CODE LAMP
MF LI CONT
SPKR
LI VOLUME CONTROL
L2 VOLUME CONTROL
VARI-GAIN CONTROL
EXT EQ RESET TIP
EXT EQ RESET RING
AUDIO ACCESS
REM RESET JACK
MINIMUM RECEIVE LEVEL
ALARM RELAY TIP
ALARM RELAY RING
EXT EQUIPMENT RESET
AUDIO OUT
REMOTE RESET
ERROR ALARM
PART OF A12
SF SUPERVISION (OPTIONS 485 ONLY)
HIGHEST REFERENCE DESIGNATIONS
REFERENCE DESIGNATIONS NOT USED
NOTES:
1 UNLESS OTHERWISE INDICATED RESISTOR VALUES ARE IN OHMS CAPACITOR VALUES ARE IN MICROFARADS
2 E&M, L1, L2, RESET, AUDIO, AND ERROR JACKS CONNECTED IN PARALLEL WITH J24 IN THE REAR OF THE RACK MOUNTED VERSIONS OF THE T1S-2761
3 REFER TO SECTION 5 FOR 230 VAC OPERATION
4 ALL CONNECTIONS (XX) ON THE PERIMETER OF A12 ARE PART OF J18 EXCEPT THE 22 PINS OF J18 IN THE TRANSFORMER ASSEMBLY, THOSE CONNECTIONS LISTED IN TABLE
5 OPTIONS 4 AND 5 DO NOT INCLUDE 86. ALL OTHERS DO NOT INCLUDE 84
01203
(E-2761-00-3001

Figure 7—1. Model 2761 Overall Schematic Diagram.

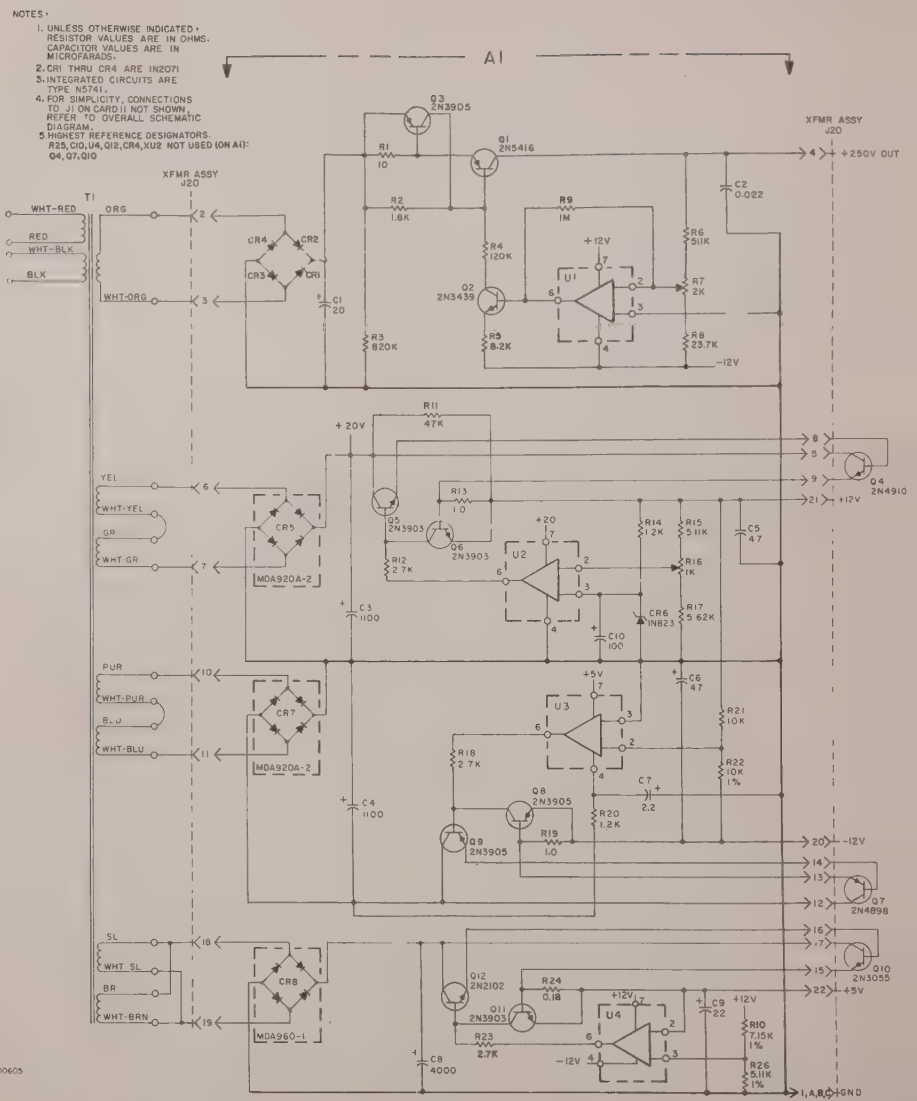
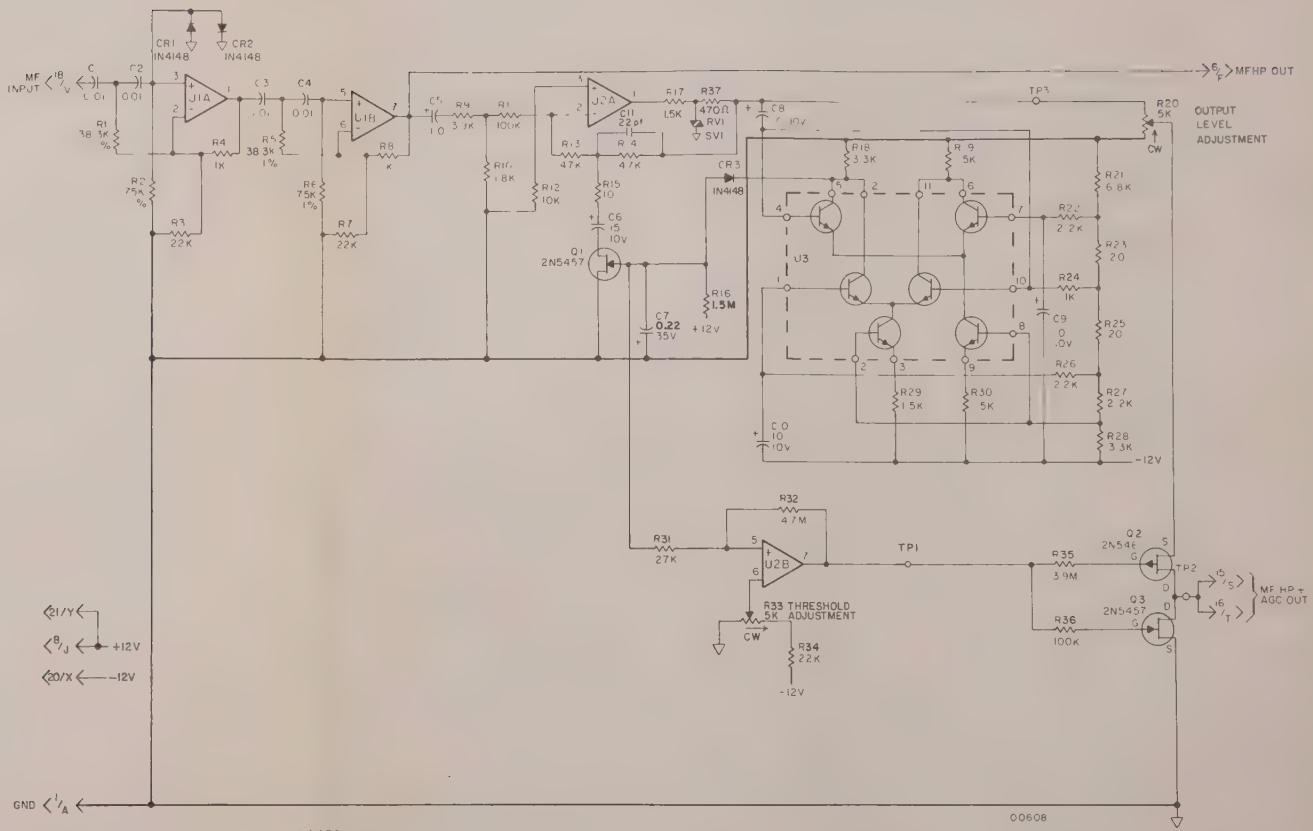


Figure 7—2. Model 2761 Power Supply (A1) Schematic Diagram.



	TYPE	+V	-V
U1-U2	N5558V	8	4
U3	CA3026		

NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
2. MAX REFERENCE DESIGNATIONS USED: R37, C11, U3, Q3, RV1, CR-1.

Figure 7—3. Model 2761 MF Input (AGC) (A2) Schematic Diagram.

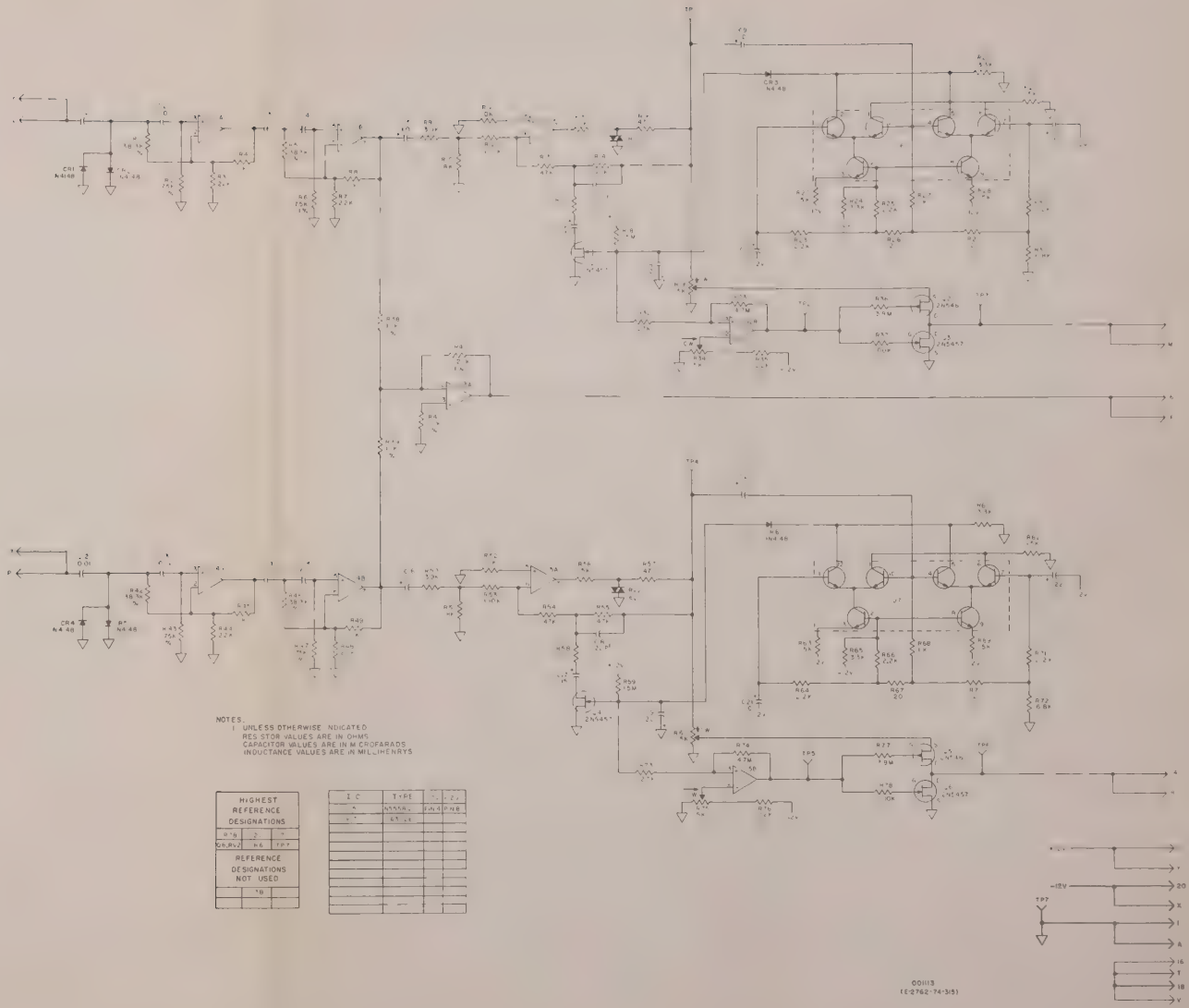


Figure 7—4. Model 2761 Dual AGC (A2 of Options 4 and 5) Schematic Diagram.

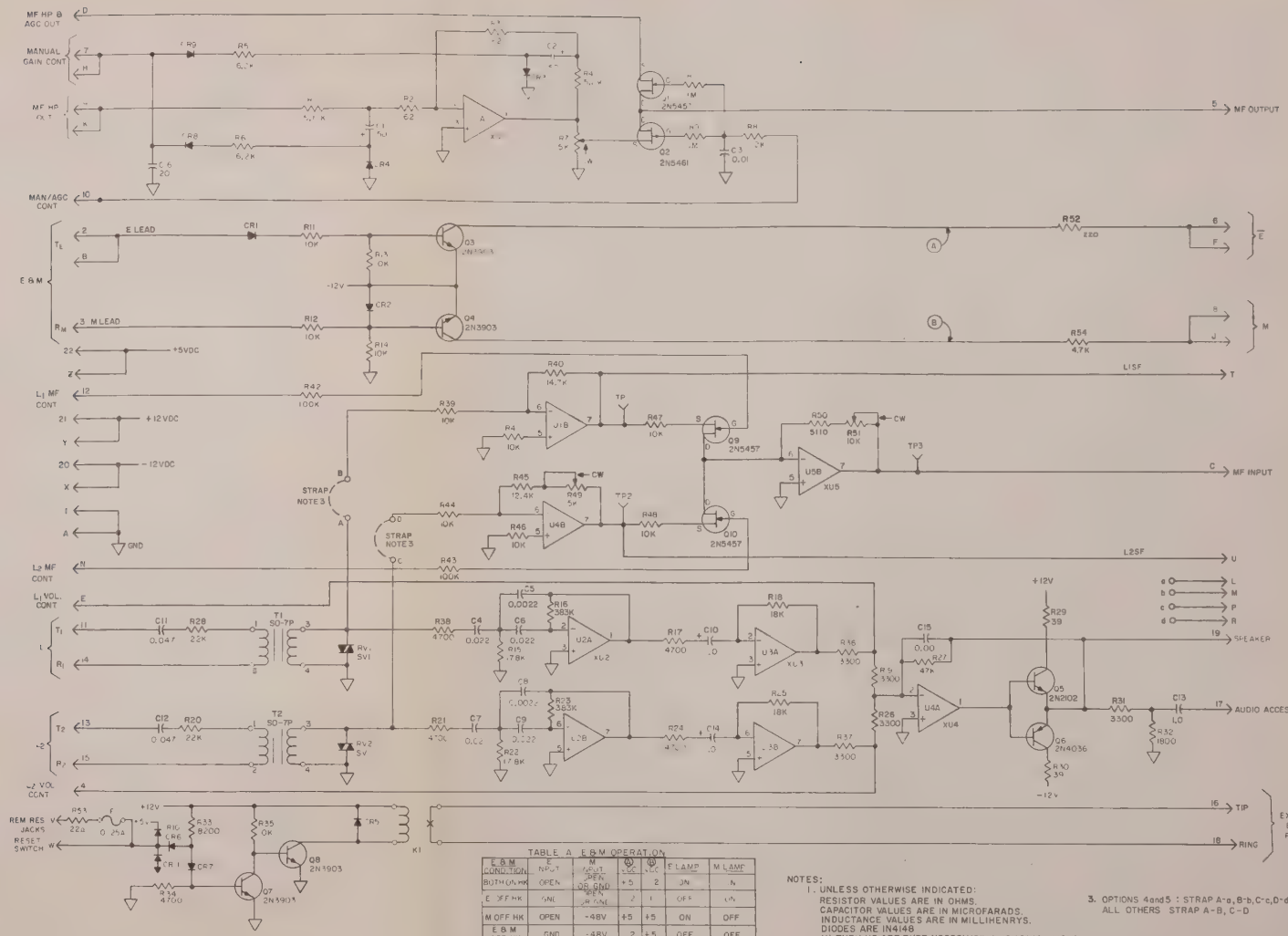


TABLE A E&M OPERATION

E&M CONDITION	E INPUT	M INPUT	E LAMP	M LAMP
BUTTON HK	OPEN	OPEN OR GND OPEN	ON	ON
E OFF HK	GND	OPEN	OFF	ON
M OFF HK	OPEN	GND	ON	OFF
E&M OFF HK	GND	GND	OFF	OFF

NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
   DIODES ARE IN4148
   U1 THRU U5 ARE TYPE N5558V(PIN 4=+12V, PIN 8=+12V)
2. HIGHEST REFERENCE DESIGNATIONS ARE R54, C16, CR11, RV2, U5, Q10, K1, T2, F1, XU5, TP3. NOT USED: U5A.
3. OPTIONS 4 and 5: STRAP A-a, B-b, C-c, D-d.
   ALL OTHERS STRAP A-B, C-D

Figure 7—5. Model 2761 Main Input (A3) Schematic Diagram.

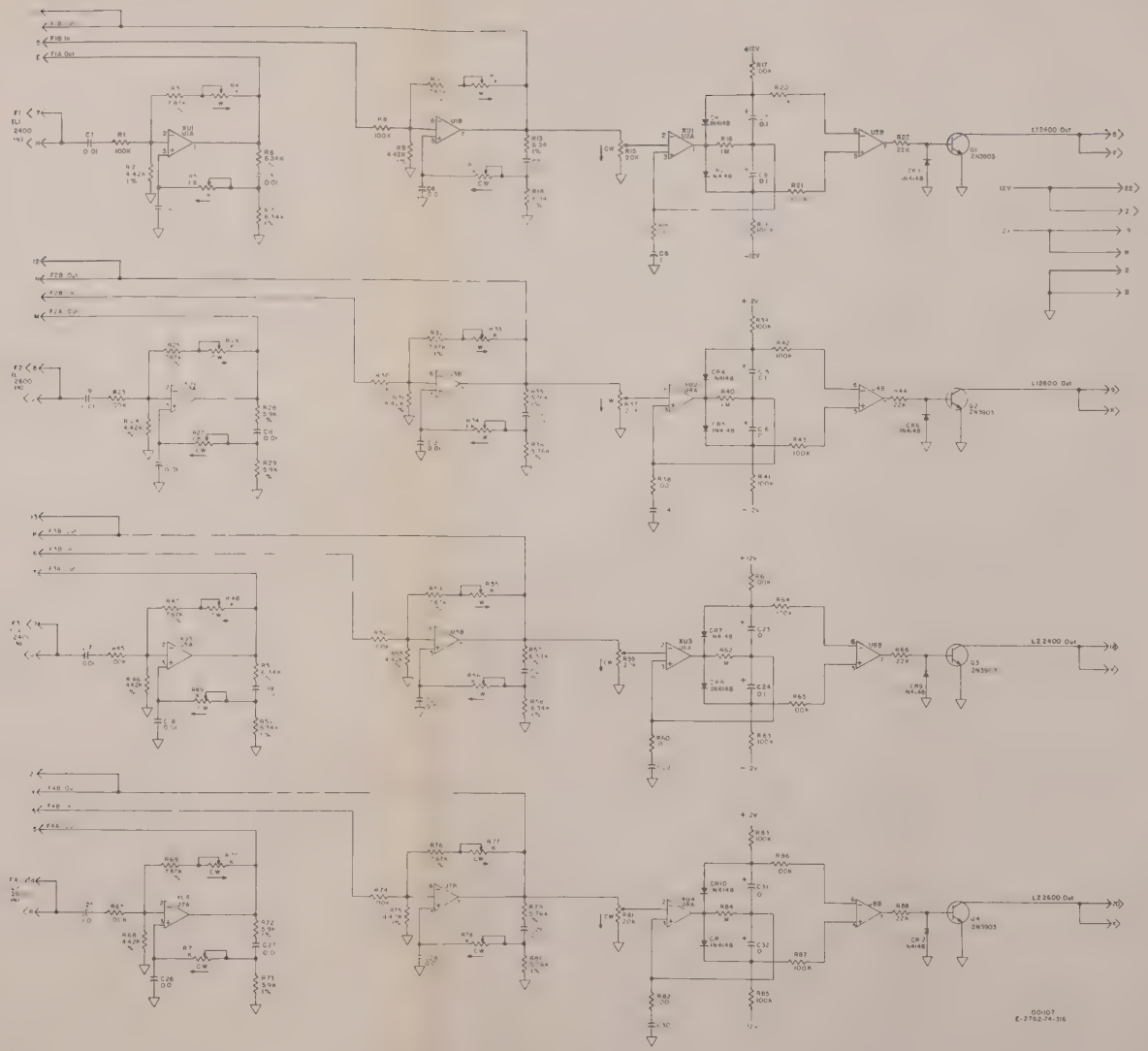


Figure 7—6. Model 2761 SF (VF) Detectors (A4) Schematic Diagram.

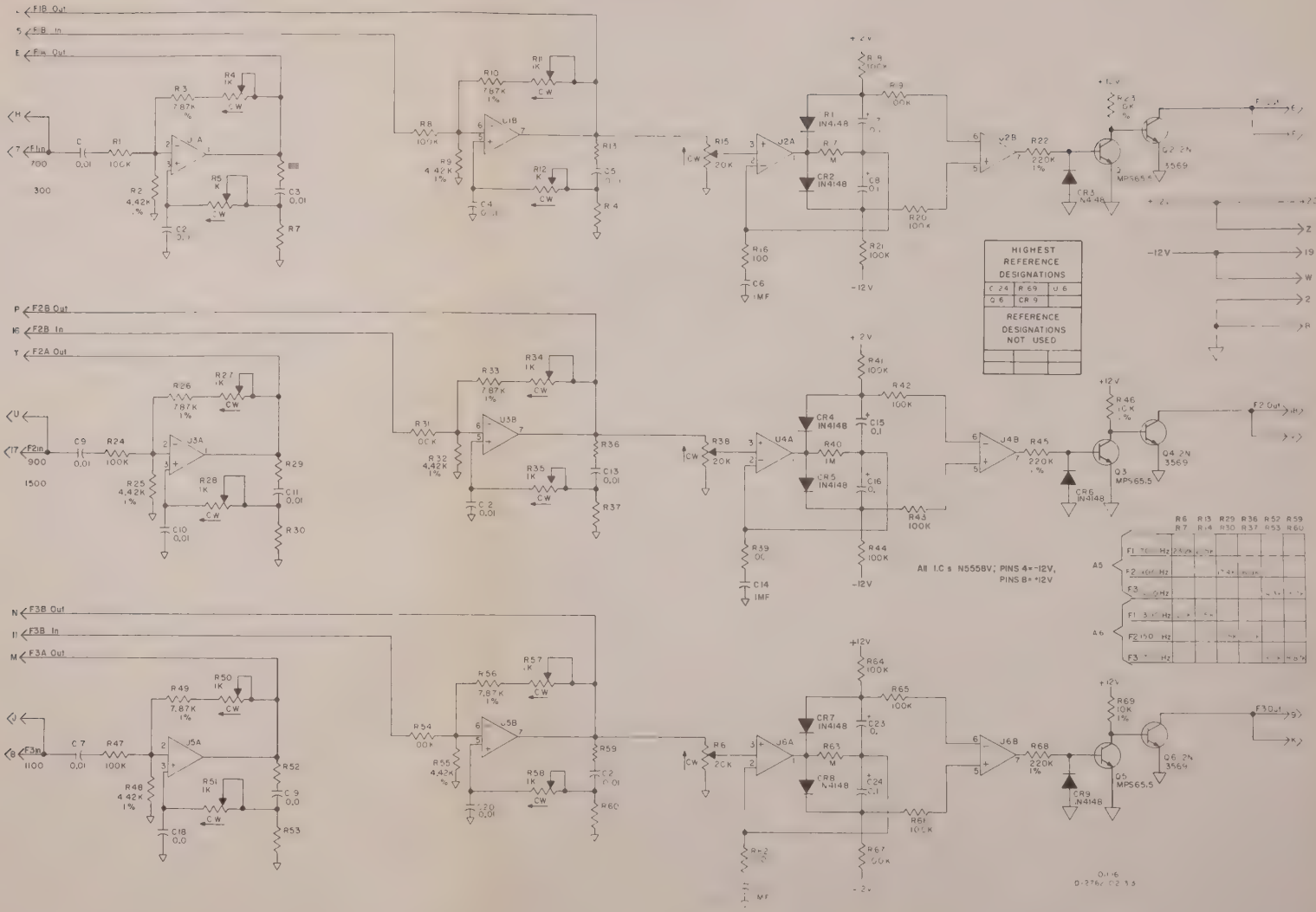


Figure 7—7. Model 2761 MF Detectors (A5 and A6) Schematic Diagram.

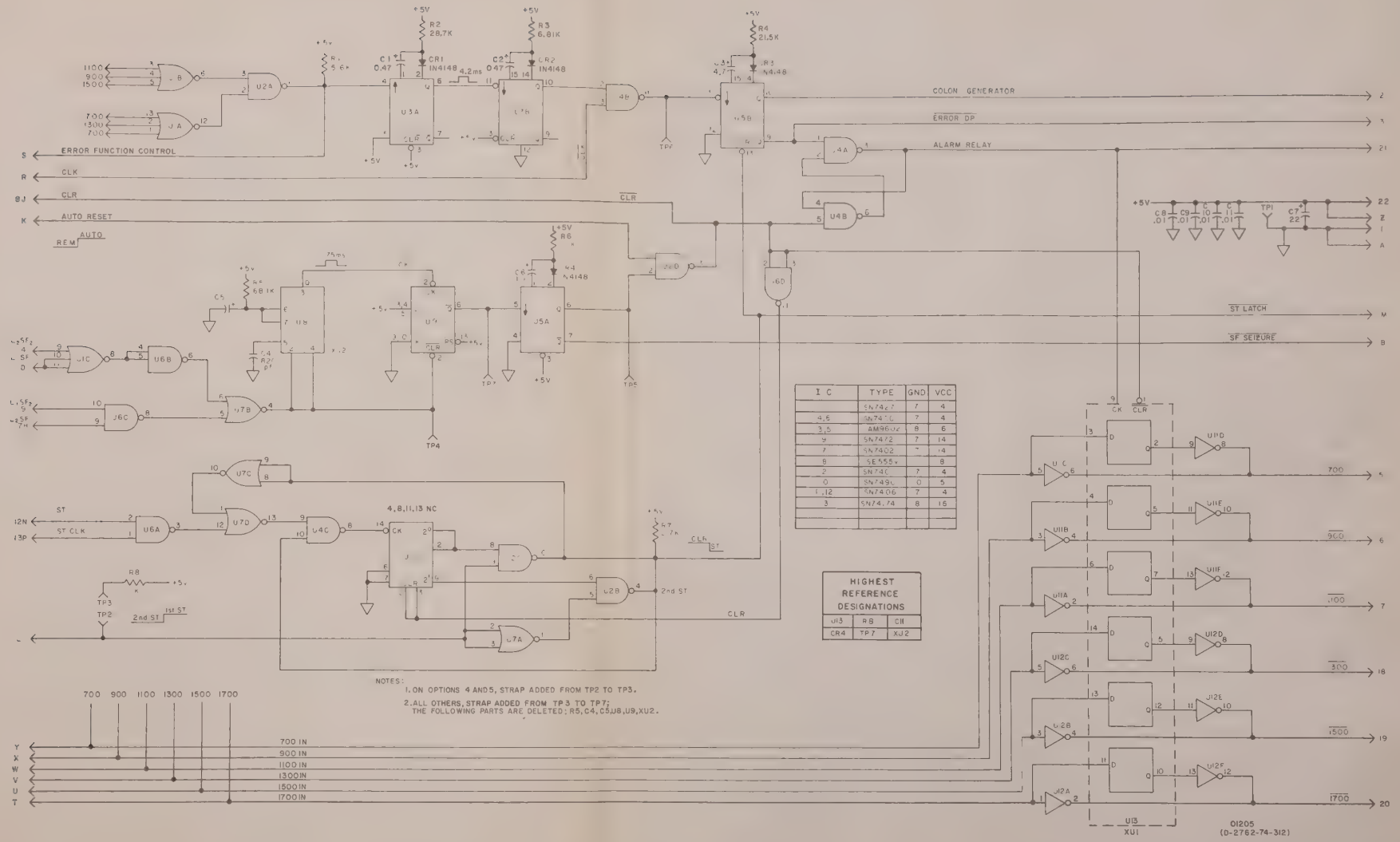
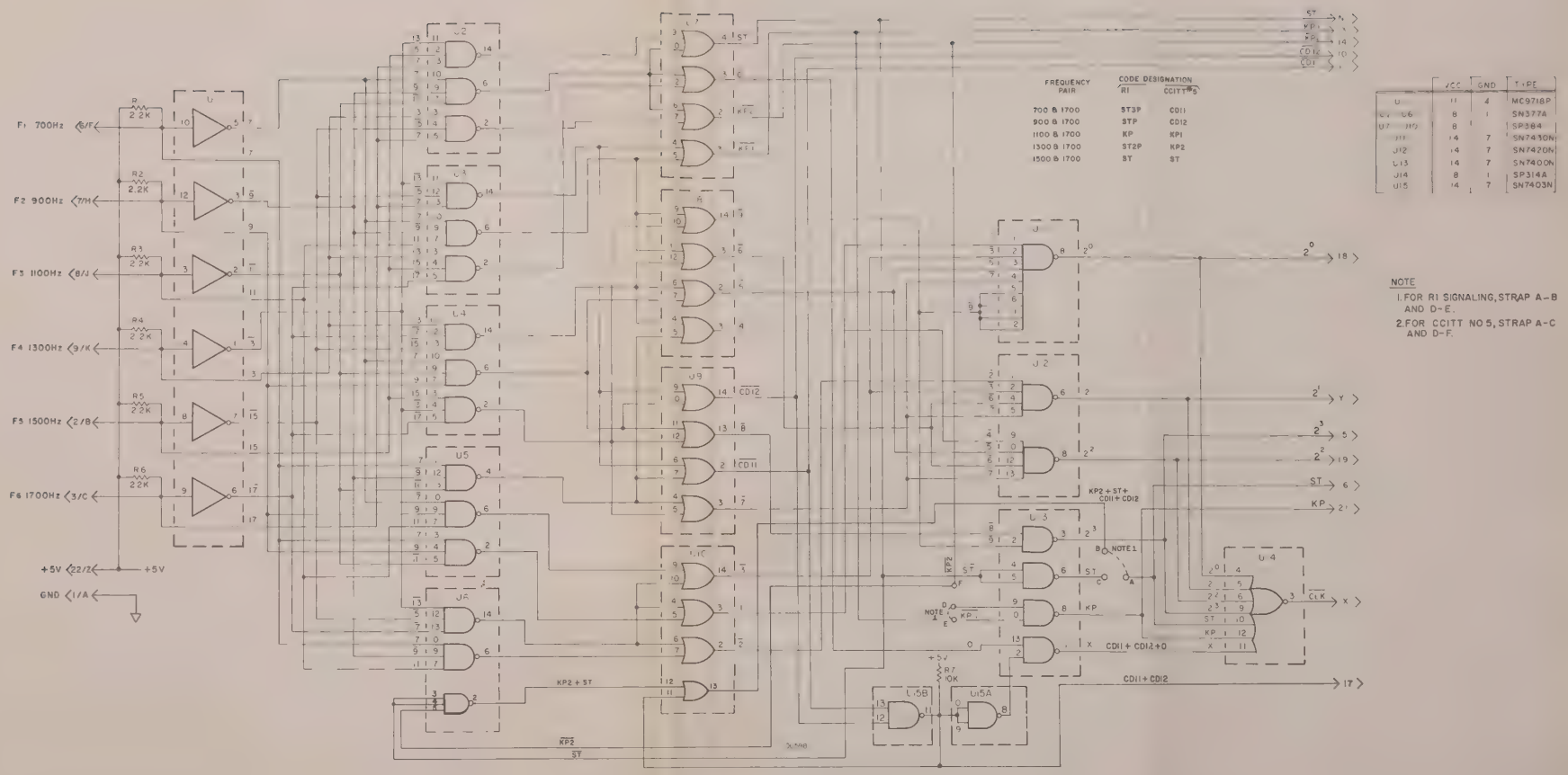


Figure 7—8. Model 2761 Error Detector (A7) Schematic Diagram.



	VCC	GND	TYPE
U1	11	4	MC9718P
U2, U6	8	1	SN3774
U7, U10	8	1	SP384
U11	14	7	SN7410N
U12	14	7	SN7420N
U13	14	7	SN7400N
U14	8	1	SP314A
U15	14	7	SN7403N

Figure 7—9. Model 2761 MF Decoder (A8) Schematic Diagram.

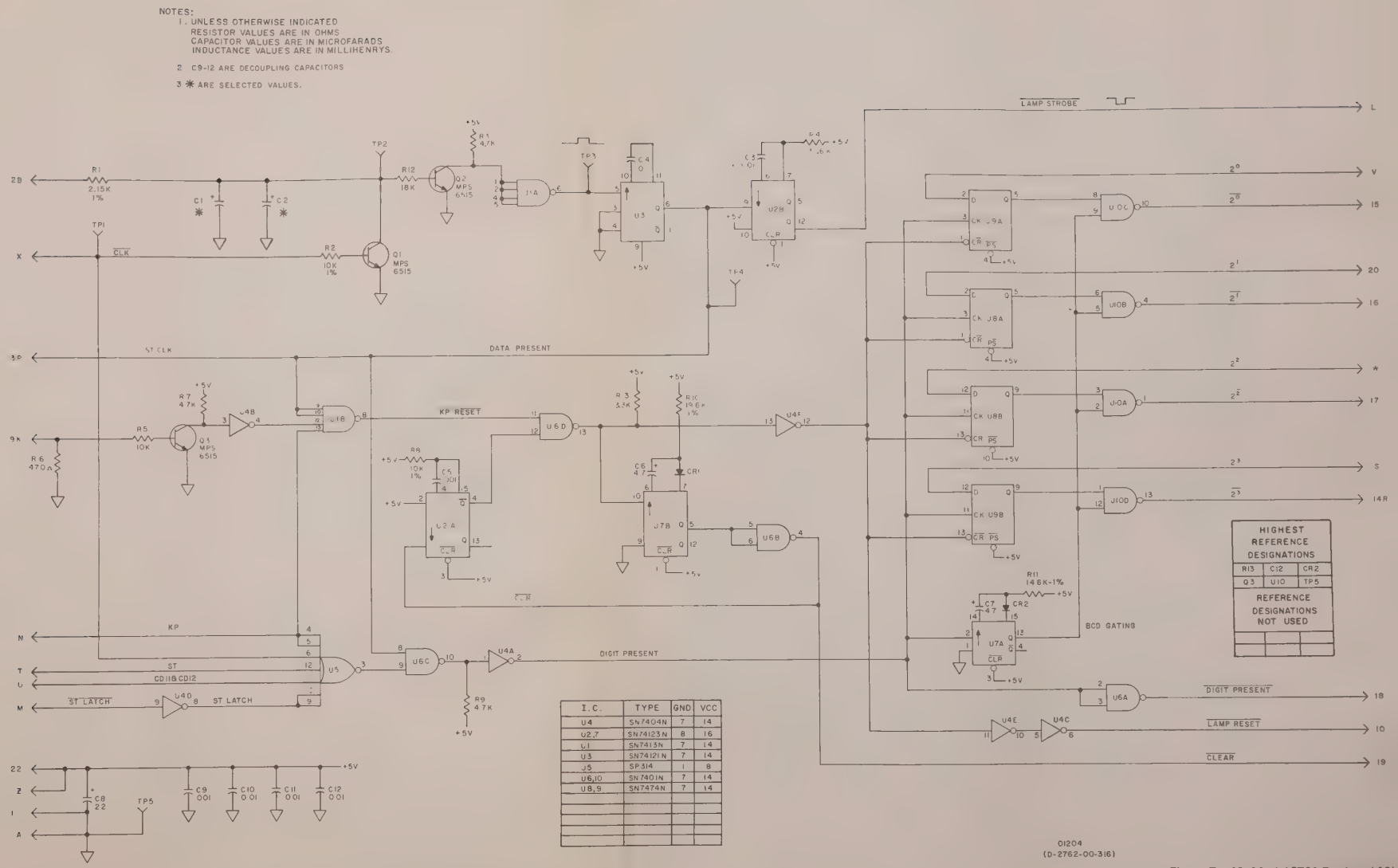
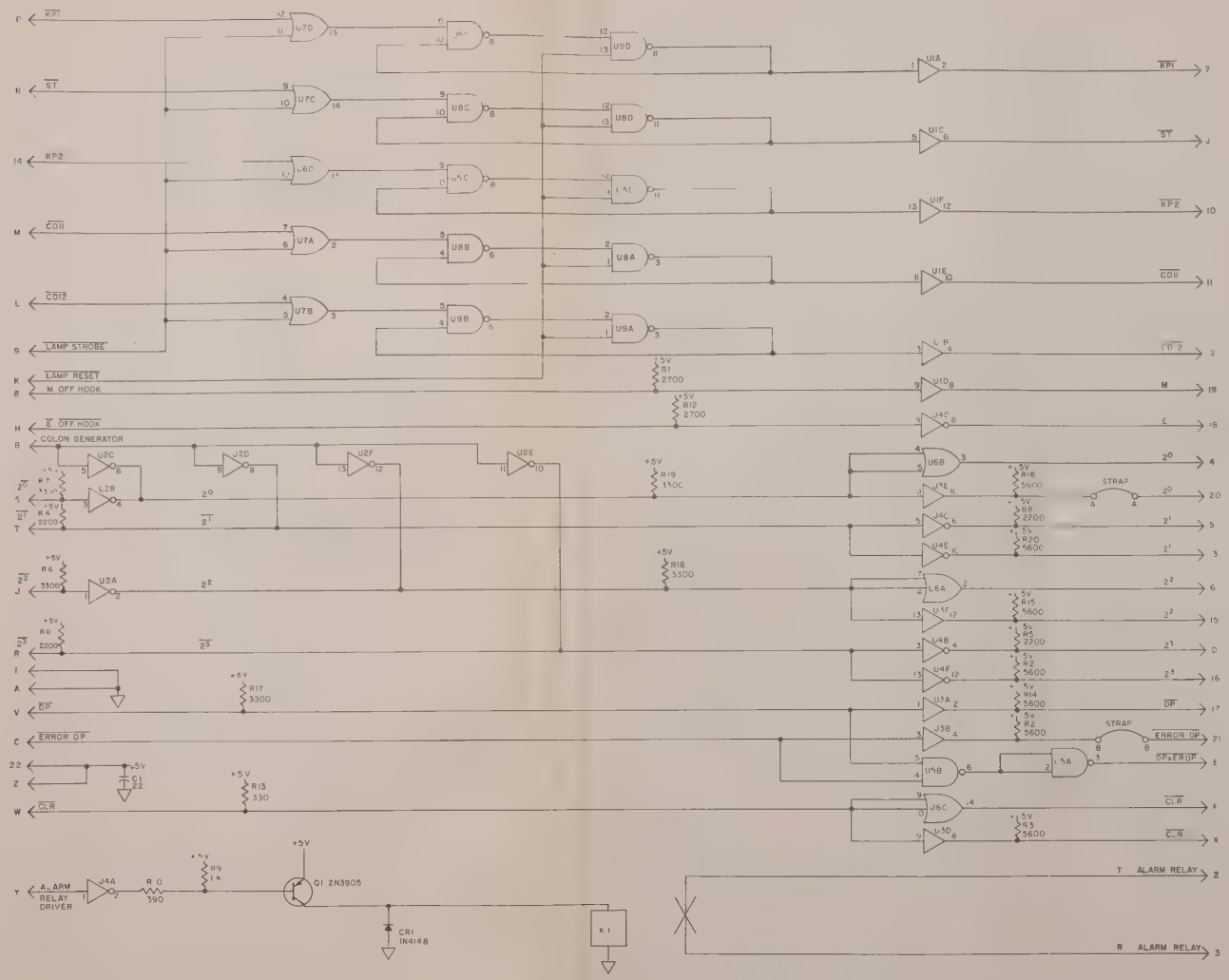


Figure 7—10. Model 2761 Register (A9) Schematic Diagram.



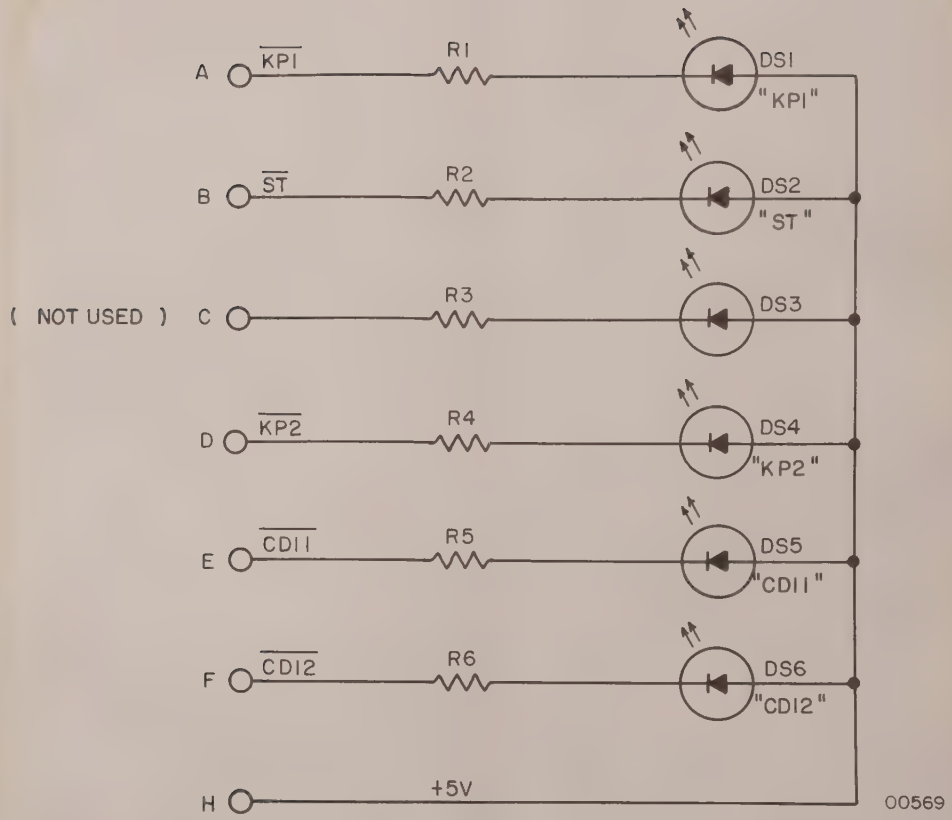
HIGHEST REFERENCE DESIGNATIONS		
U9	R21	Q1
K1	CR1	C1
REFERENCE DESIGNATIONS NOT USED		
	U3C	

I C	TYPE	GND	VCC
U6, U7	SP384	1	8
U5, U8, U9	SN74J0N	7	14
U1, U3	SN74J7N	7	4
U4	SN7406N	7	4
U2	SN7405N	7	14

NOTES:
1. UNLESS OTHERWISE INDICATED:
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN MICROFARADS.
INDUCTANCE VALUES ARE IN MILLIHENRYS

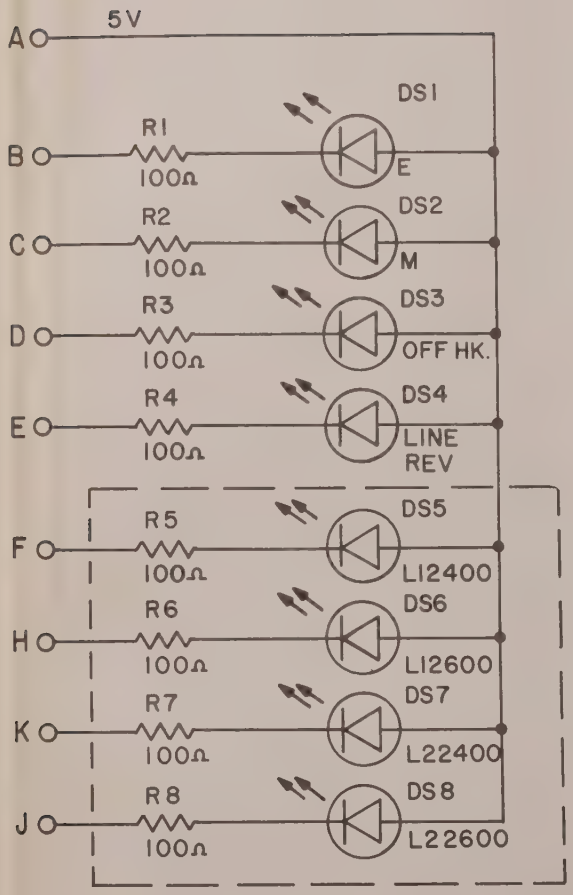
01108
(D-2762-02-317

Figure 7—11. Model 2761 Buffer (A11) Schematic Diagram.



NOTE:
ALL RESISTORS ARE 100 OHMS.

Figure 7—12. Model 2761 Code Lamp (A13) Schematic diagram.

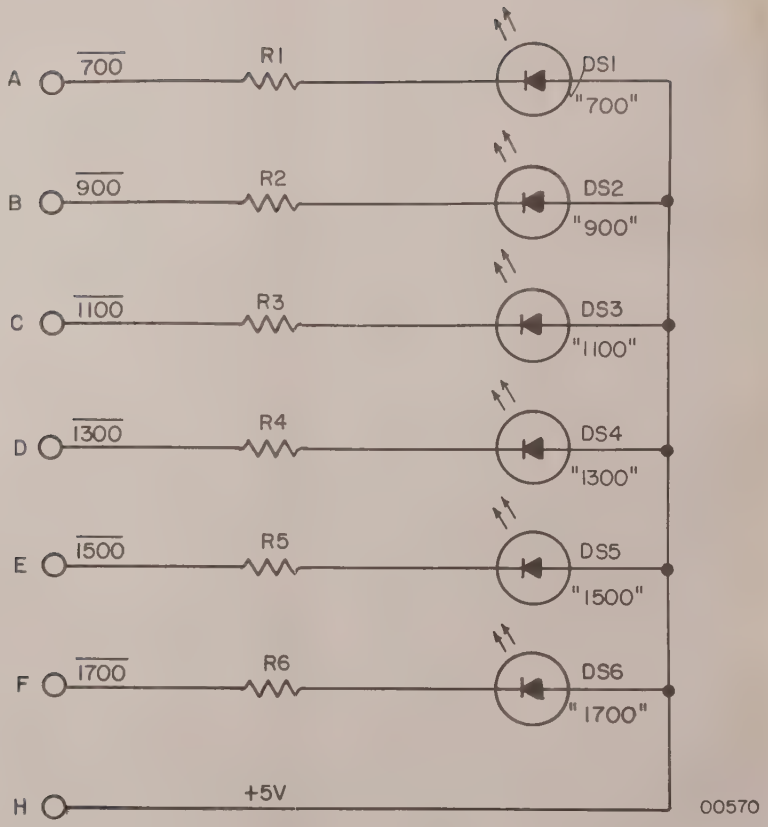


NOTE

THOSE COMPONENTS (R5-8, DS5-8) WITHIN DOTTED LINES INCLUDED IN OPTIONS 4 AND 5 ONLY

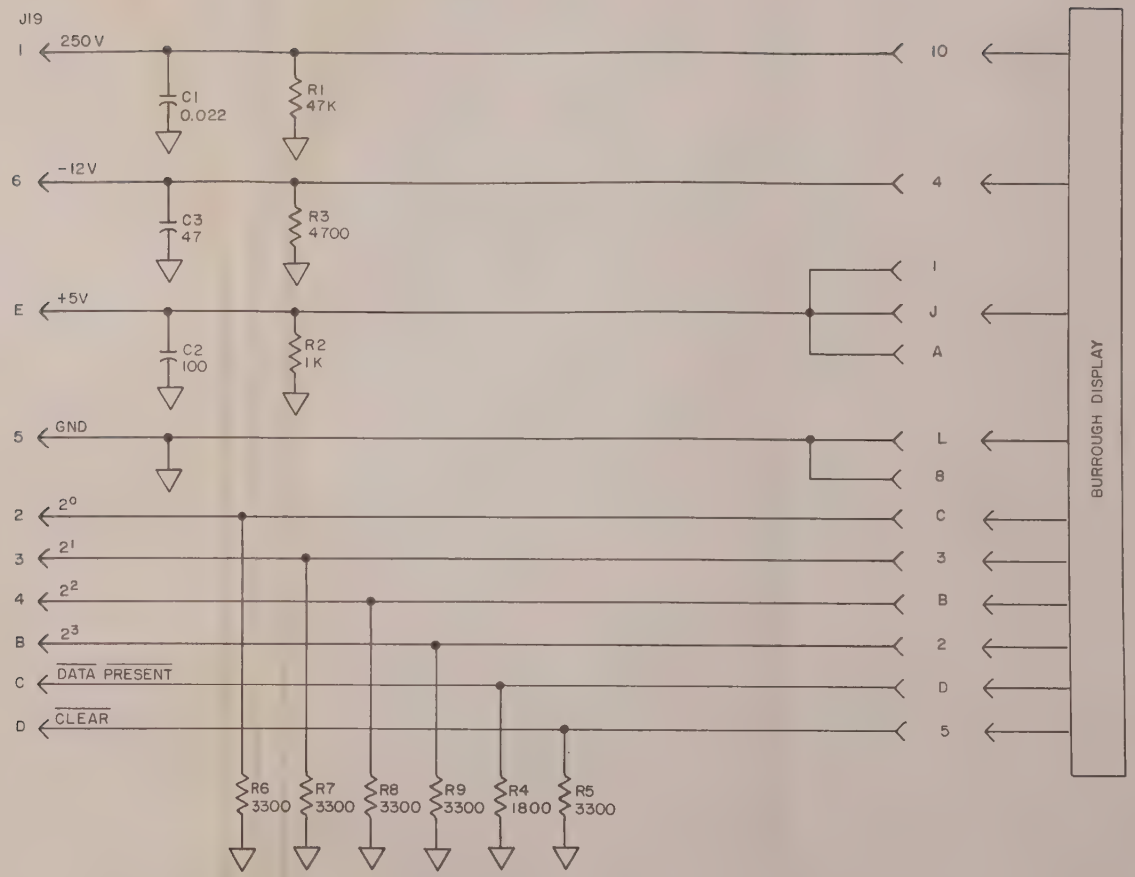
01105

Figure 7—13. Model 2761 Supervision (A14) Schematic Diagram.



NOTE:
ALL RESISTORS ARE 100 OHMS.

Figure 7—14. Model 2761 Frequency Lamp (A15) Schematic Diagram.



NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.

Figure 7—15. Model 2761 Termination (A16) Schematic Diagram.

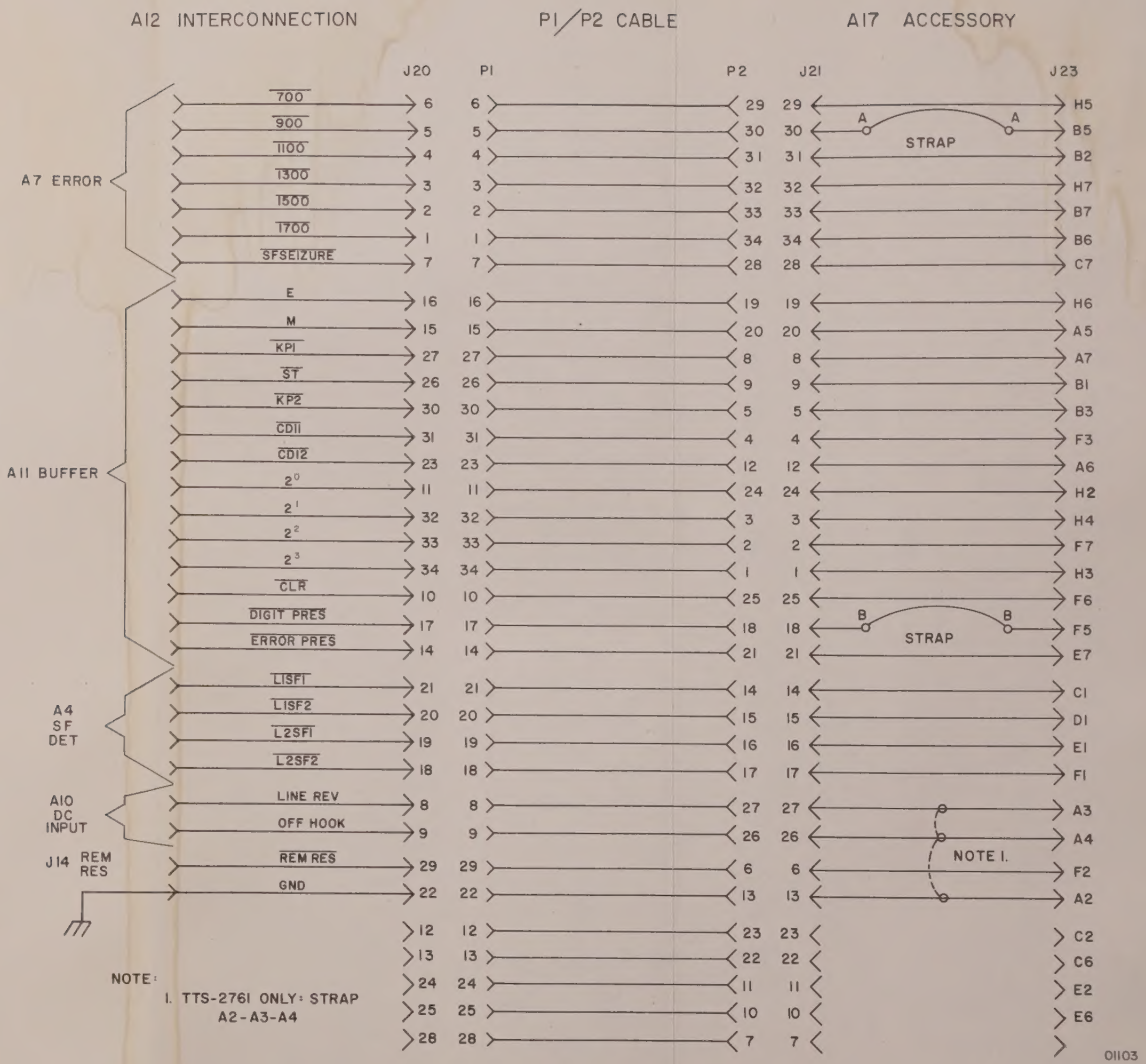


Figure 7—16. Model 2761 Accessory (A17) Schematic Diagram.

82003